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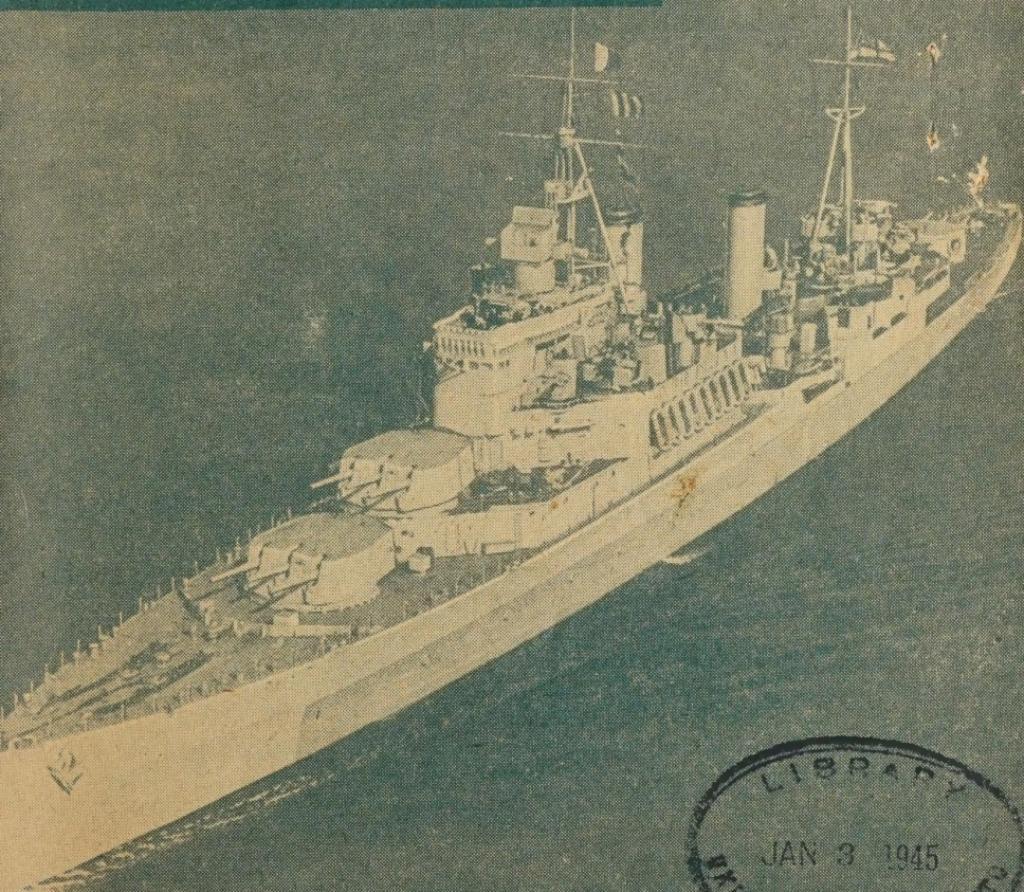
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CANADA AT WAR

No. 42

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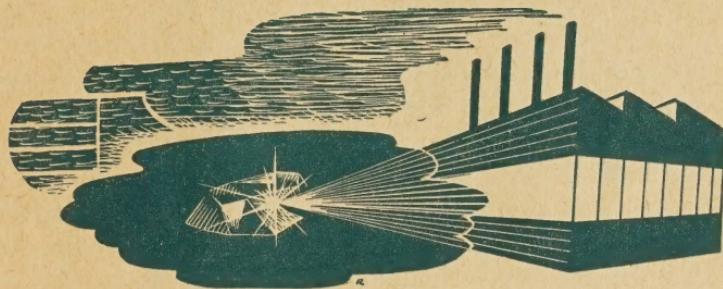
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The Cover: First of two cruisers for Canada's growing navy, the powerful 8000-ton *Uganda* was recently transferred from the Royal Navy to the Royal Canadian Navy. H.M.C.S. *Uganda* is 549 feet long and carries an all-Canadian complement of some 800 men.

CANADA AT WAR is a factual, monthly reference booklet of basic information on Canadian war activities. The material contained in it may be reproduced in whole or part, with or without credit to the Wartime Information Board.

Victory from Vision



IN modern mechanized warfare guns, tanks and aircraft would be helpless were it not for the finely balanced precision instruments used for sighting, measuring distance and aiming. As most targets are out of the eye range of the gunner, the gun itself must have eyes—delicate devices for magnifying the power of the human eye. These devices, called fire control instruments, are as important as the weapons themselves. Usually of the telescopic type, they depend for their almost unbelievable powers and accuracy on lenses and prisms—that is, optical glass. As accuracy is largely dependent on quality of the image, glass used must be the best.

Wherever guns are fitted with telescopic sights, lenses and prisms of optical glass are needed. The modern army must have rangefinders to measure distance, sighting telescopes to figure out the direction of gun fire, vast quantities of telescopes and binoculars; every big gun needs a dial sight to determine direction; a tank requires a periscope so the men inside can operate it with safety; long range naval guns are fitted with a most complicated firing control measure.

The one-metre rangefinder used with field artillery requires 27 optical parts which are assembled in such a way that high accuracy is achieved for dis-

tances as great as 10,000 yards. Even relatively simple standard types of binoculars have 16 optical pieces.

The glass used to manufacture these pieces differs from ordinary glass in such things as bottles, windows and costume jewellery, for it must be absolutely clear and homogeneous. It must be free from bubbles and streaks and marks which are not considered imperfections in ordinary glass. It must also have definite properties with respect to the bending of light (refractive index) and the variation in the refractive index for light of different colors (dispersion). Production of such glass is a difficult and highly controlled process.

New Canadian Industry

In peacetime the manufacture of optical glass is a minor industry. The factories of the United Kingdom, Germany, Switzerland, Belgium, Czechoslovakia and, since World War I, the United States could easily supply the world's requirements of glass for such instruments as telescopes, microscopes, binoculars, cameras and a few military instruments. For any such manufactured in Canada, optical components were imported.

During war, however, an adequate supply of optical glass is of utmost importance. When Hitler's armies began sweeping over Europe in the early stages of the present war, continental sources of optical glass were cut off. The United Kingdom could supply scarcely enough for its own needs, and its factories were operating under the constant threat of enemy bombing. In Canada a few universities and the National Research Council had been experimenting with optical glass, but its manufacture was felt to be too difficult for any large-scale production here.

In the first year of the war it was estimated that Canada could manufacture 80% of the munitions needed by Canadian forces, but optical glass and instruments were not included. The same year, however, doubt arose as to the adequacy of existing sources of supply, and Canada decided to venture into the field. A small group of engineers was sent to the United Kingdom to study production methods. They returned with a few trained optical glass workers from British factories, and around this nucleus an entire industry was built.

Less than nine months after the first sod was turned, a

Canada's new optical glass industry is turning out such instruments as range-finders, gun sights. Here a skilled expert breaks glass from giant crucibles into lumps which will be chipped into small pieces for moulding.



modern plant was in operation and the first pour of glass was made. Two months later, in August, 1941, the first instrument, a prismatic gunsight, was delivered.

Spectacular Production

Since the spring of 1941 Canada has produced approximately 2,000,000 pounds of optical glass, 613,500 in the six months ended September 30, 1944. (In World War I all United States companies produced only about 1,250,000 pounds.) At peak production, 65,000 pounds were being turned out each month. It was originally planned that two melts be made every week and glass of nine different types manufac-

tured. The number of melts has increased to 30 a week, and 15 types of glass are produced. In five weeks during the summer of 1944, 203,179 optical pieces were turned out.

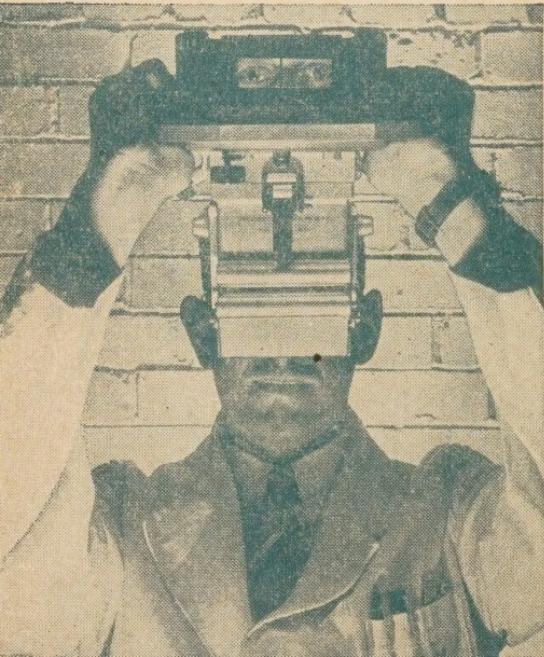
Research Enterprises Limited

Perhaps the most unique feature of the Canadian production record is that the glass itself as well as all parts of the optical instruments are produced in one plant—Research Enterprises Limited, a crown company at Leaside, Ontario. This is the only plant in the British Commonwealth and Empire and one of the few in the world that manufactures the complete instruments. In other countries it

takes the co-operation of three or four separate industries to turn out the finished product. Before the plant itself was completed, optical glass was in production, and the machine shop was producing instrument parts.

Canada is now producing enough optical glass and instruments to fill the needs of the Canadian army and still export sizable quantities to the United Kingdom and the United States. In fact, the majority of its production is now destined for services other than Canadian. A large number of precision instruments is also being made for the navy, and certain special

Worker at Research Enterprises Ltd. tests Canadian-made tank periscope.



items are being made for the air force. Rejections are increasingly few, and Canada's optical instruments are rated as the equal of those produced anywhere else.

Mass production methods as well as accumulated experience have resulted in considerable cuts in the cost of production. The Vickers tank periscope originally cost \$250 to produce, but this was reduced to \$70. Of the 825,000 pounds of glass produced during 1943, 500,000 were turned out at the remarkably low cost of \$1.08 a pound.

So that instruments of Canadian manufacture can serve anywhere in the world, they are tested for temperatures ranging from 60 degrees below zero to 160 degrees above (Fahrenheit). They must, of course, have absolute clarity of vision, be shock-proof, able to stand constant handling and extremes of humidity as well as temperature. In the first half of 1944 from 10 to 12 times the quantity of optical instruments originally scheduled was being made. Value of the total production stood at \$26,000,000 at the end of September.

Research Enterprises Limited is now the allies' largest manufacturer of six-by-thirty binoculars and one-metre rangefinders

and one of the largest producers of all types of binoculars and dial sights. This achievement has largely been possible by the co-operation of United Kingdom and United States firms. As many of the problems facing Canada in 1940 were met by United States manufacturers in 1917 when a United States optical glass industry was set up, their records have been invaluable.

In addition to the optical components turned out at Research Enterprises Limited, the National Research Council has undertaken a special job of lens manufacture. From plates of glass imported from the United Kingdom, its scientists are turning out photographic lenses of six-inch diameter and 36-inch focal length, suitable for taking aerial pictures from a height of 30,000 feet. This is the first time that any kind of photographic lens has been manufactured in Canada. These lenses

are sent to the United Kingdom where the complete photographic apparatus is made.

Glass Making Procedure

The procedure of making optical glass is a continuous round of heating, melting, moulding, cooling (annealing), inspecting, grinding and polishing. Several chemical compounds are used, the most important of which are silica sand, soda, potash, lead, lime, borax and barium. Most of the raw materials are imported from the United States. The relative amounts of the ingredients predetermine the refractive index and therefore the type of optical glass of the batch.



Inspector at R.E.L. checks dial sights for field guns.

The sand-like ingredients are mixed thoroughly, then placed in 1,200-pound clay pots (also made at Research Enterprises Limited) and immersed in highly controlled furnaces to be melted, stirred and fused. These enormous crucibles hold 2,000 pounds of glass.

One of the most important steps in the manufacture of optical glass is the stirring process and precise control of melting conditions. A slight variation in the temperature of part of the batch will cause imperfection. Constant scientifically-controlled mechanical stirring helps to free the mixture from bubbles, ensure homogeneity within the melt and prevent the formation of layers or *striæ*.

Actually it has been the job of the Canadian manufacturer to produce quickly, not to conduct experiments, and existing glass-making methods and procedures were copied for use here; but it was Canadian scientists who worked out a melting program whereby the high quality of the British glass was combined with the greater speed of United States production methods. Under its speeded-up melting schedule Canada was soon melting more glass than the model company in the United Kingdom.

The entire founding process which includes all operations from setting the pot in the furnace to stirring, removing and annealing the batch takes eight days. The annealing must be as carefully controlled as the heating. After an initial spraying by streams of cold water to solidify the glass, even the temperature and cool it to 600 degrees centigrade (1,112 degrees Fahrenheit) the cooling is gradual.

When completely annealed, the glass-filled pot is broken by sledge hammers and crowbars. The pieces of pottery are salvaged to be used again in the mixing of materials for new pots. The glass is broken into irregularly-shaped lumps which are later chipped into specified sizes for moulding. A great deal of skill is required to chip the glass into suitable pieces, avoid excessive hammer blows which bruise and mark the glass and avoid making chips which are too small for handling. Of the 2,000-pound batch only about 500 pounds can be turned into lenses. The remainder is discarded, chipped into small pieces and used again in the melting pot where it has the effect of speeding up the melting process and helping to remove bubbles.

Chunks of glass passed for moulding are gradually heated until they are sufficiently malleable to be moulded by a fixed plunger which cuts out plates or discs of required dimensions. These pieces are then taken to a controlled furnace which reserves the heating process to cool them. This second annealing process takes about four days.

The plates are then thoroughly inspected for faults by the "parallax" method in which light from a point source passes through the glass and shows up all imperfections on a screen. The slightest fault is cut out by a diamond-tipped cutter, and the rejected glass is returned to the melting pot.

Lenses and Prisms

Some lenses and prisms are cut from the plates; others must be remoulded. In this case the plates are chipped to the correct weight and placed in special furnaces, then moulded to the required shape. Once again they must be annealed, inspected and ground before being turned over to the instrument shop. The grinding process is slow and precise and is done on automatic machines also manufactured in the plant. The finished lens or

prism is polished, and sights requiring several optical parts are cemented together with perfectly transparent cement.

The cement used was formerly from Canadian balsam. In extreme temperatures, however, it melted or cracked, and a plastic cement has been developed and is now used almost entirely. Optical components are then ready to be put into the military instruments which are manufactured in other parts of the plant. Some completed instruments no larger than the palm of a hand have as many as 300 parts and require from 1,500 to 2,000 operations in their manufacture.

Personnel

One of the major difficulties in establishing a new industry, especially one that requires fine precision and allows no margin for error, is trained personnel. In addition to setting up the mechanisms for making glass, the original nucleus of experts had to undertake an extensive training program. Today more than 2,500 workers are employed in the optical glass and precision instrument section of Research Enterprises Limited, and all of them have been trained in their exacting trade in the plant.

Canada's New Shipbuilding Industry

"It is in no small measure due to Canadian shipyards that the Battle of the Atlantic was won, that today the oceans do not sever but link up the United Nations; that immense armies and air fleets smash Germany's last defences and that the bastions of the Japanese Empire are constantly and successfully assailed.

"The Royal Navy and the British Admiralty are proud to acknowledge their debt."

VICE-ADMIRAL SIR ALFRED EVANS, head of the British Admiralty technical mission in Ottawa, on the occasion of the launching of the 1,000th ship built in Canadian shipyards.

CANADA'S shipbuilding industry, dormant for more than 20 years before 1939, is now of major importance to the war effort of the United Nations. On October 21, 1944, Canada marked the launching of the 1,000th ship built in Canadian shipyards during the war. In addition to the construction of naval and cargo vessels, the shipbuilding program includes the expansion of ship yards and the repair of naval and cargo ships. Cost of the program approximates the objective of the seventh Victory loan — \$1,300,000,000. Boatbuilders from canoe makers to operators of giant freighter yards are turning out warcraft.

In 1939 there were 14 fairly large yards with limited facilities and about 15 smaller boatworks. Since then the industry has been built up to comprise 21 major shipyards, four major outfitting yards and approximately 65 smaller boatbuilding organizations. Existing yards have been greatly expanded, and graving docks, piers, machine shops, marine railways and a large floating drydock capable of berthing two ocean-going vessels at one time have been erected for ship repairs.

In September, 1939, only nine berths were available for the construction of large vessels; today there are more than 50.

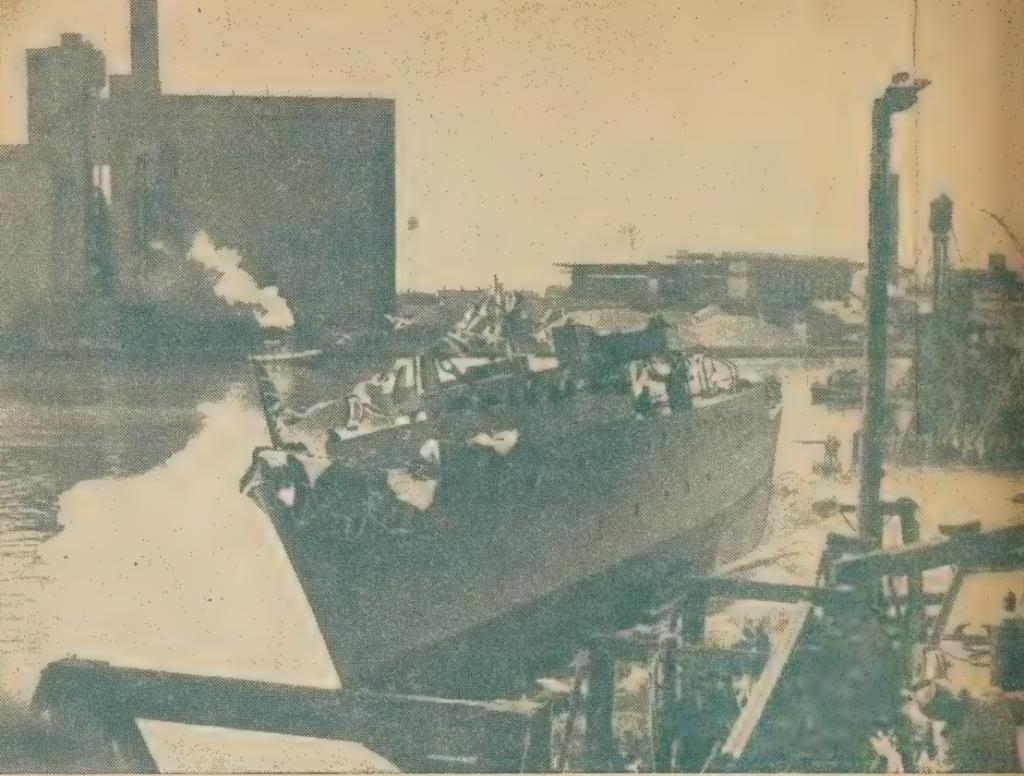
From 4,000 men employed in shipbuilding at the beginning of 1940, the number of personnel engaged has increased to more than 100,000 men and women, including workers in component and ancillary industries. Ships are launched not only from seaboard provinces, but from yards along the St. Lawrence River and as far inland as Port Arthur at the head of the Great Lakes, more than 1,700 miles from the great eastern port of Halifax. Components of Canadian-made ships are produced in more than 300 plants across Canada. Mines, plants and factories across the nation have contributed thousands of tons of materials and finished products for these ships.

Between World War I and the present war not one seagoing merchant ship was built in Canada. Now 352 freighters, tankers, victualling ships and maintenance vessels have been launched. This total includes 292 10,000-ton freighters similar to the United States Liberty ship. The Canadian type now being turned out is a modification of the British North Sands and Victory types and can burn either coal or oil. It was de-

signed in Canada to provide an efficient cargo ship for Canadian operations.

Here is what one such ship could carry in one trip in the way of a mixed cargo stored in the various holds and on the deck: Enough flour, cheese, bacon, ham, canned and dried foods to feed 225,000 persons for one week; 2,150 tons of steel and war metals; enough carriers, trucks and motorcycles to equip a full infantry division; enough bombs to load 950 medium bombers or 225 heavy bombers; enough plywood, lumber, wallboard and nails to build 90 four-room cottages or a row of dwellings nine blocks long; two complete bombers stowed on the afterdeck and enough aluminum in the holds to build 310 medium bombers or 640 fighters.

Maintenance vessels which are now being built on the west coast and of which 21 have been ordered are of the same basic type as the 10,000-ton cargo ships, but are intended to serve as floating workshops able to travel far out to sea for many weeks to repair and refit damaged warships. They will be outfitted with the machine tools, machin-



Minesweeper H.M.S. *Myrmidon*, 1000th Canadian-built ship, is launched at Toronto.

ery, welding and other equipment necessary for such operations.

More than 900 of the 1,000 ships have been delivered. Canadian-launched combat vessels now number 500, of which 451 have already been turned over to the Royal Navy or the Royal Canadian Navy. These include 63 frigates, 114 corvettes of two types, 112 steel minesweepers of four types, 50 wooden minesweepers of two types, and 112 patrol and torpedo boats.

In addition to the lighter escort vessels four large Tribal class destroyers—the newest and fastest type of destroyer afloat—are also being built. Two are under construction in east coast yards and two are being outfitted there.

Canada's own merchant shipping needs have been filled by slightly more than one-third of its production. More than 100 ships have been delivered to the United Kingdom under Mutual Aid to be operated by the British

Ministry of War Transport and to be returned to Canada after the war. Ninety merchant ships have been sold outright to the United States, and two to the United Kingdom.

Special purpose vessels launched since the beginning of the war number 148 and include such ships as transport ferries, base ships, salvage vessels, railway barges and large steel tugs. Transport ferries are the largest warships built in Canada. They are specially designed by the British Admiralty as part of an immense flotilla intended for large-scale amphibious operations. Canadian shipyards are

the first in the world to turn out this particular improved type which is highly complex and difficult to build. Seven yards on the west coast and along the St. Lawrence River are engaged on contracts for these vessels, and so far six have been launched. Fifty are on order—all designed for the use of the Royal Navy.

At least 87 of the ships now being built in Canadian yards are slated for action in the Pacific. Besides the 50 transport ships and 21 maintenance vessels under construction, contracts have been let to Quebec and

SHIPS LAUNCHED BY OCTOBER 21, 1944

(APPROXIMATE BREAKDOWN)

COMBAT VESSELS AND NAVAL CRAFT



Tribal Destroyers	2	10,000-ton freighters	292
Frigates	70	10,000-ton tankers	12
Corvettes	80	10,000-ton maintenance vessels	3
Revised Corvettes	42	10,000-ton vicecwalling ships	7
Algerine Minesweepers	57	4,700-ton freighters	30
Bangor Minesweepers	60	3,600-ton tankers	6
Western Isles Minesweepers	16	165-ft. naval auxiliary tankers	2
Minesweepers (105' and 125')	61		
Fairmile Patrol Boats	88		
Motor Torpedo Boats	24		
	500	GRAND TOTAL	1,000

CARGO VESSELS AND TANKERS



SPECIAL VESSELS



Base supply ships, gate vessels, boom vessels, derrick ships; supply and salvage vessels, railway and military ferries, large steel tugs, etc.

148

352

1,000

west coast shipbuilders for 16 350-ton coastal cargo ships. These sturdy little steel-hulled ships will serve as all-purpose cargo carriers in the Pacific.

In addition Canada has turned over to the army, navy and air force more than 6,500 small craft in hundreds of different types. Many of these are manufactured in small inland boatworks that before the war were famous for canoes, launches and other pleasure craft. They include 1,380 standard military landing craft, 900 invasion supply barges and a wide variety of lifeboats, refuelling tenders, pontoons and other smaller ships.

It would require approximately 50 miles of wharves to

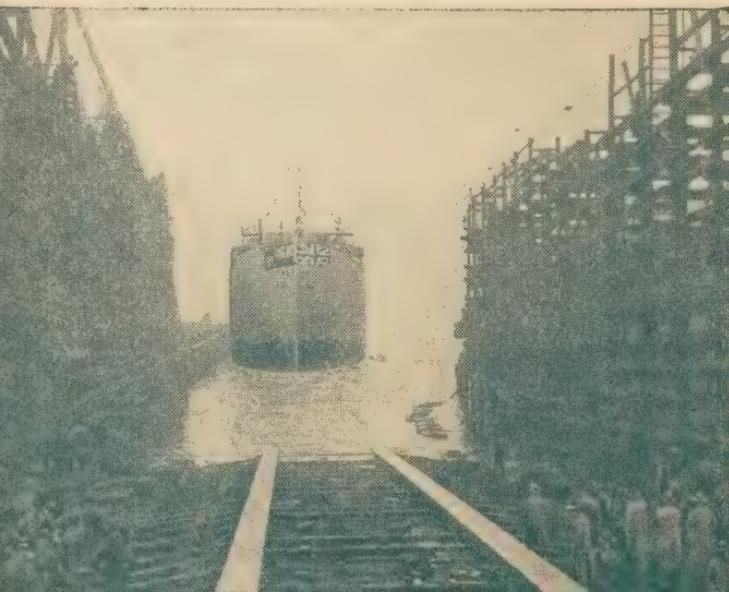
dock Canada's 1,000 vessels stem to stern or an area of about 12,000,000 square feet to anchor them.

Cost of Canadian ship production, excluding many millions of dollars spent on ship conversion and the small craft program, is as follows:

Freighters and tankers	\$619,000,000
Combat ships.....	458,000,000
Ship repair.....	58,000,000
Expansion of building facilities.....	42,000,000

Costs of Canadian-built ships are approximately as follows:

Frigate.....	\$ 1,500,000
Algerine minesweeper	1,200,000
New type corvette...	1,000,000
Large freighter.....	1,700,000
Large tanker.....	2,000,000
Medium freighter....	1,250,000
Medium tanker.....	1,000,000



On October 21, nine ships, one for each province, were launched, bringing the Canadian-made total to 1,000 since war began. Representing Alberta, here is No. 994, H.M.S. *Berry Head*, 10,000-ton maintenance ship launched at North Vancouver, B.C.

Women



ON the home front the women of Canada have made a splendid contribution to the cause of victory. More than 41,000—one woman in every 66 between the ages of 18 and 45—have joined the three women's services; almost one woman in every four who is gainfully occupied in Canada is working in war industry; hundreds of thousands are working on farms, in wartime governmental staffs, in their homes and in many volunteer war services.

Navy

More than 5,600 have enlisted in the Women's Royal Canadian Naval Service since its organization in mid-1942, and 150 recruits are still being

called up each month. No longer is it a novelty to find a Wren in bell bottom trousers taking over a signal bridge at a Canadian navy base or handling any other of 30 different kinds of work, most of which used to be considered solely masculine.

They act as postal clerks, sick berth attendants, writers, stenographers, supply assistants, coders, wireless telegraphers, etc.

Wrens are serving at more than 50 establishments in Canada, the United Kingdom, Newfoundland and the United States. More than 150 are in the United Kingdom and Eire, and more than 200 in Newfoundland. Overseas they serve with the Canadian Naval Mission and also 34 with the navy show.

The director of the W.R.C.N.S. has stated that there is little possibility of service in the Pacific campaign for Wrens, but there will likely be an important part for them in the period of demobilization when tremendous amounts of paper work would be handled by Wren clerks and typists in naval offices.

Army

Largest of the women's services, the Canadian Women's Army Corps, which was established in August, 1941, now has an enlistment of more than 19,000. More than 1,300 are serving overseas—approximately 1,200 in the United Kingdom, and small contingents in the France-Belgium-Netherlands area and Italian theatre. It is estimated that the C.W.A.C. has released the equivalent of one division of men for field action.

Recent Wren arrivals
explore London.



One of 14 Wrens trained to take over 8-hour watches on R.C.N. signal bridges.

C.W.A.C. personnel work at more than 50 different types of employment, including general clerks, stenographers, cooks, transport drivers, draughtswomen, wireless operators, cipher clerks, etc. At Barriefield, Ontario, C.W.A.C. ordnance officers are receiving special ordnance training in handling the enormous equipment supplies.

Air Force

Organized in July, 1941, the Women's Division of the Royal Canadian Air Force grew from an auxiliary service to an integral part of the air force, with women replacing men in all possible ground crew duties. In November, 1944, enlistments were more than 16,800 with more than 1,300 airwomen on active service overseas.



A C.W.A.C. contingent newly-arrived in France unloads equipment and settles down.



Night duty in Italy—army nurses in tent.

Enlisted primarily to assist in the gigantic training plan of the R.C.A.F., the women have been trained in more than 40 different trades. "W.D.'s" act as clerks in all the offices, as timekeepers checking on the flying hours of student pilots, as aircraft helpers, as motor transport drivers, telephone operators, parachute riggers; they are on duty in control towers and in secret operations rooms—

keeping watch over shipping and aircraft movements along coastal defence areas. They are photographers, wireless operators, meteorological observers and coders.

Medical Services

More than 3,782 women were serving as nursing sisters or doctors in the armed forces by November, 1944. In the Royal Canadian Navy nursing service were 282, including 75 serving in New-

In operations room W.D.'s of the R.C.A.F. plot position of all aircraft flying in Canadian skies.

Queen Elizabeth visits W.D.'s in England.





R.C.A.F. nurses study methods of air evacuation of sick and wounded.

foundland and 21 in Scotland; in the Royal Canadian Army Medical Corps, 3,041, of whom 2,069 were serving overseas; and in the Royal Canadian Air Force, 401, of whom 49 were serving overseas, including four in France. There are 58 women doctors in the services—seven in the navy, 40 in the army (six overseas) and 11 in the air force.

Women in the Labour Force

New positions opened up by expanding war industry and as a result of men entering the forces have drawn more and more women into the wage-earning field. By June 1, 1944, among approximately 5,016,000 Canadian persons over 14 years of age who were serving in the armed forces or otherwise gainfully occupied more than 1,000,000 or 22% were women.

The proportion of women gainfully occupied rose from 18% of the pre-war total to 25% of the total estimated at June 1, 1944. Within this group the number of women in war industry increased from 9% of the total employed at the census date (June 2, 1941) to 20% at June 1, 1944. The rise of women workers in civilian industry has been even greater, from 27% at June 1, 1939, to 41% at June 1, 1944, when out of an estimated 1,827,000 workers engaged in non-war industry approximately 745,000 were women.

Women have moved out of the less essential types of personal and domestic service into industries with higher priority. The number of women employed in manufacturing has increased from 143,000 in June, 1939, to 340,000 at June 1, 1944, when female employees accounted for

Airwomen expertly pack parachutes for their flying brothers.



28% of all persons engaged in manufacturing. About 30% of the women employed in manufacturing are married, not including part-time workers where the percentage is undoubtedly higher. Now there are more than twice as many women engaged in trade and public services as at the beginning of the war.

From July, 1940, to October, 1944, 52,514 women had enrolled in emergency training classes under Canadian Vocational Training. During September 1944, 1,013 were in training.

Women's Voluntary Services

A great wealth of voluntary effort on the part of the women of Canada is being channelled into many vital activities through the Women's Voluntary Services—a division of the Department of National War Services. Hundreds of such voluntary

On the home front these skilled women fill death-dealing 20 mm. shells.



A W.V.S. member instructs her young charges at a day nursery in Toronto.

groups from coast to coast are doing a big job in easing the strains of war and making the lives of service members at home and abroad more comfortable. Canteen work, magazine depots, ditty bags for seamen, child care, victory gardens, war savings stamp drives—these are but a few of the vital projects being aided.

Day Nurseries

Under the Dominion-provincial plan for wartime day nurseries there are now in operation in Ontario 30 day nurseries, six kindergarten units and 38 school centres for day care of children. In Montreal there are six day nurseries. These have enabled hundreds of skilled married women to engage in essential war industries.

Canada Conquers Rubber Famine

TODAY natural rubber in Canada is still in very short supply, but the overall situation is much more favorable than in early 1942. With all but a small supply of natural rubber cut off since Pearl Harbor, and faced with unprecedented war demands the nation at that time was confronted with extremely grave conditions.

That this situation is immensely improved is the result of four programs that were adopted: The procurement of an early though insufficient reserve of natural rubber, the application of rigid controls and restrictions, the collection of salvage rubber and its use in reclaim, and the spectacular development

and production of synthetic rubber.



and subsequent war needs. By the time rubber was placed under the jurisdiction of the supplies control on August 26, 1941, the Fairmont reserve amounted to 25,000 tons.

It was soon evident that this was not enough. Fairmont was given a monopoly over buying and selling crude rubber, and the stockpile was to be increased.

Controls and Restrictions

At the same time the supplies control began a program of progressive restrictions on the use of natural rubber. When Japan attacked Pearl Harbor further steps followed quickly. Within three days all civilian dealings in new tires and tubes had been prohibited except by permit. The next day all processing of crude rubber for civilian purposes was frozen. Next, rubber prices were fixed, and the first step toward active synthetic production was taken with the setting up of a rubber substitutes advisory committee.

The rubber processors have been under strict control, and the rubber they have used, whether for war or civilian manufacture, has had to be processed according to specifications. No rubber has been released, even for war purposes, except by permit.

At the close of 1943 applications for civil allotments of natural or synthetic rubber were considered only for essentials such as tires, footwear, surgical and laboratory supplies, specified industrial uses, suction and gasoline hose. Whether in peace or in war, more than three-quarters of Canada's rubber goes into

tires and tubes. Immediately after Pearl Harbor, one of the first restrictions was a ban on the manufacture of new passenger tires and tubes. A year later this was modified to the extent that reclaim instead of crude would go into any new passenger tires which were essential. In late 1943 when supplies of synthetic rubber became available no passenger car or small truck tires contained crude rubber except a small percentage used in the cement.

By stringently confining the list of those persons considered as eligible (such as doctors) for three preferred categories, and by strict rationing of tires, it was estimated that the vehicles in the preferred categories numbered about 700,000 in a total of about 1,250,000 passenger cars and 250,000 trucks in Canada. Thus about 800,000 motorists have not been permitted to buy tires or tubes of any kind, new or old, since early in 1942.

As a result of these and further restrictive measures adopted by the supplies control and its successor, the rubber control, consumption of rubber for civilian purposes averaged in 1943 about 10% of what it was before the

war. From this 10%, tires have been provided for essential vehicles, but since Pearl Harbor no tires have been made for the non-essential car.

Still vitally necessary for the carcasses of large army, air force and essential civilian truck tires, for medical equipment, for certain cements and for certain other purposes, natural rubber is in seriously short supply. Canada's small stock trickles in from Ceylon, Mexico, Brazil and Liberia. Compared with a consumption of 60,000 tons in 1941, Canada is having to get along on 10,000 tons in 1944. The normal peacetime consumption is about 35,000 tons. The 1944 total consumption of rubber and its substitutes on this basis is: Natural rubber, 18%; reclaim, 27%; synthetic rubber, 55%. Even with the same equipment Canadian factories can turn out only four-fifths as many synthetic tires as natural rubber tires.

Salvage and Reclaim

Restrictive orders were not alone responsible for the saving of the priceless rubber supply. Much of it has been achieved by the use of substitutes and reclaim in the manufacture of

hundreds of essential articles, including war supplies.

Canada has on hand enough scrap rubber to last two years. During the early years of the war the scrap obtained by dealers and through the efforts of the National Salvage Committee was of high quality, but when reclaim rubber began appearing on the market in the form of tires, footwear and other articles, the scrap proved almost valueless. Foreseeing this eventuality the government determined in 1941 to gather together all the good quality scrap and stockpile it. Up to February, 1944, 45,167 tons of scrap rubber had been received by Fairmont.

The number of pounds of reclaim rubber used was:

1941	22,179,755
1942	32,694,000
1943 (approximately)	30,000,000

Until late 1943 measures of control over scrap and reclaim were closely parallel to those over crude rubber. When synthetic rubber became available these restrictions were gradually relaxed, and on February 15, 1944, Fairmont ceased all purchases of scrap rubber.

From 650 to 700 tons of scrap rubber are needed to make 500

tons of reclaim. Reclaim is processed in Canada in two plants with a productive capacity of 7,000 tons a year. A similar amount of reclaimed rubber is imported from the United States annually. Rubber reclaimed from scrap is not a 100% substitute for crude rubber. Synthetic rubber is considered superior to reclaim. Despite a large stock of reclaim material the facilities for producing tires were already used to capacity in the production of crude and synthetic rubber tires for army and civilian use.

Synthetic Rubber

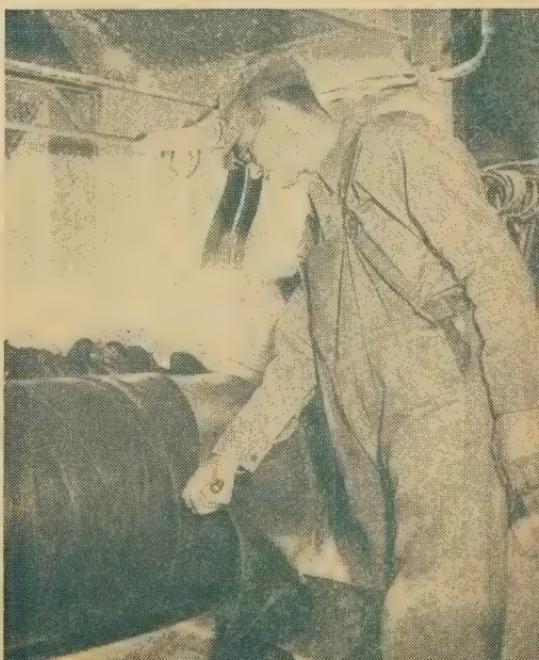
The search for a satisfactory synthetic rubber has been in progress for many years. Chemically rubber and petroleum are closely related. In a rubber tree the carbon and hydrogen atoms are so arranged molecularly as to form rubber. In oil-bearing deposits a different arrangement within the molecule of the same hydrogen and carbon produces petroleum. Science's problem was to perfect a process whereby petroleum could be broken down into its basic elements and reconstituted into rubber.

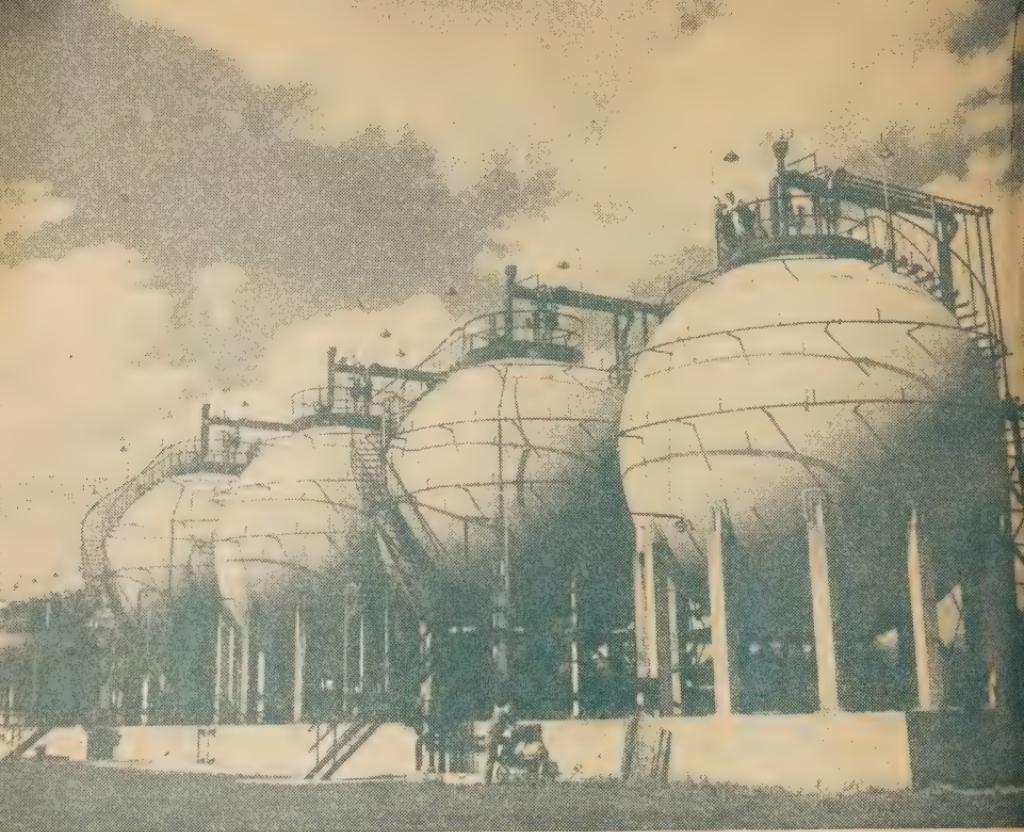
The "black magic" which produces this metamorphosis is

roughly as follows: Benzol extracted from coke and reacted with a petroleum hydrocarbon known as ethylene produces styrene. From another petroleum "cut" comes butadiene. Three parts of butadiene, one part of styrene, soap as an emulsifier, catalysts to speed the reaction, salt and acid produce buna-S, the best all-round synthetic rubber for mechanized armies to roll on.

Technical research in rubber-like materials is continually progressing, and some day the perfect all-purpose synthetic rubber may be made. That day has not come, and in the meantime

Finished synthetic rubber for tires is cut in slabs then milled and cooled.





Giant spheres store components of synthetic rubber for Polymer plant near Sarnia.

buna-S, butyl and neoprene are the three vulcanizable synthetics most closely resembling real rubber. The North American program for developing artificial rubber has centred around these three materials. Canadian production is confined to buna-S and butyl rubber.

About mid-1943 supplies of buna-S, butyl and neoprene began to flow in from the United

States. The importation of neoprene will continue indefinitely, but the first two are now produced in such quantity in the Canadian plant as to make imports unnecessary. In fact some buna-S is now being exported.

Polymer Plant at Sarnia

In the last months of 1941 the rubber situation had become so serious that prompt action had

to be taken to ensure the replacement of the quickly vanishing rubber stock in Canada. Following the pattern of the United States in developing synthetic production, a government-owned company, known as Polymer Corporation Limited, was incorporated, and immediate action was taken to erect a plant near Sarnia, Ontario. Built at a cost of \$51,000,000 and representing hundreds of thousands of man-hours and tens of thousands of tons of scarce materials, this daring experiment has proved a success.

From oil, salt, soap, water and acids, the Polymer plant, within an area of 185 acres, is turning out a total of 7,000,000 pounds of buna-S and butyl rubber each month. This is the equivalent of the output from 14,400,000 natural rubber trees covering 120,000 acres in the south Pacific. To provide the Polymer output calls for about 1,800 employees, including the administrative staff. To obtain the same quantity of natural rubber would require more than 144,000 tappers plus office workers.

On September 29, 1944, exactly one year from the day of its first commercial production, the plant had turned out 60,000,000

pounds of rubber, approximately two-thirds of which was produced in the last six months. To meet an urgent need, the output climbed rapidly during the autumn and winter of 1943-44 until it reached a peak annual rate of more than 93,000,000 pounds in May, 1944. Thus the plant has proved itself capable of producing at a rate 11% greater than its original estimated capacity of 83,600,000 pounds.

The production for the year ending September 29 comprised 58,000,000 pounds of buna-S and 2,000,000 pounds of butyl rubber. The original rated capacity was 74,800,000 pounds of buna-S and 8,800,000 pounds of butyl. The peak capacity reached in May, 1944, was 88,000,000 pounds of buna-S and 5,060,000 pounds of butyl. The present rate of output is 78,000,000 pounds a year of buna-S and 9,000,000 pounds a year of butyl.

In peacetime the rated plant capacity of 34,000 tons of buna-S and 4,000 tons of butyl would be sufficient to meet all Canadian requirements, even after allowing for post-war expansion of industry and exports of finished rubber products.

The combined output of the United States and Canada, all of which is counted into the United Nations' pool, has supplied the armed forces of the Allies with all the rubber they need, and at the same time essential transportation and industry have been able to carry on at peak capacity.

The plant has done more than that. It has turned out millions of pounds of war chemicals, including blending agents for aviation gasoline. On September 29, the new cumene section was officially opened.

Speedy Construction

Few synthetic rubber plants have rolled out their first rubber more speedily than the Polymer Corporation, and these others were designed to turn out only buna-S and had the benefit of the highest priorities. In peace-time the project would have taken about three years to build. Under war pressure, its eight acres of permanent buildings, six miles of sewers, five miles of roads, and pipes, conduits, spheres and towers were completed within one year and eight months after the first sod was turned. To accomplish this more than 5,000 construction men and engineers worked virtually night

and day, Sundays and holidays, in every kind of adverse weather.

The first tree on the site, one mile south of Sarnia, was felled on June 10, 1942, but it was August 10, 1942, before the first sod was turned. Thirteen months and 19 days later, on September 29, 1943, by using styrene made at the plant itself and butadiene imported from the United States, commercial production of buna-S was begun at half capacity. Less than 12 weeks later the second half of the buna-S plant was in operation. By March 2, 1944, the butyl unit was in production, and by February 10, 1944, butadiene began flowing. With the completion of the second butadiene unit the whole project was in full operation on April 20, 1944.

Polymer Without Counterpart

The building of Polymer, however, is remarkable not only for its speed but also for its extent and complexity. To the layman it does not mean much that the plant produces not only buna-S and butyl rubber but also its own styrene, butadiene and isobutylene, as well as its own steam and electric power. To the engineer and chemist it

means that Polymer has no counterpart anywhere in the world. Some plants produce butadiene without making buna-S. One makes butadiene and butyl, another makes styrene and butadiene, and still others make only styrene. The Polymer plant is unique in that it makes the end ingredients of buna-S (styrene and butadiene), and the end ingredients of butyl (isobutylene) as well as both synthetics, buna-S and butyl.

Really the equivalent of a self-contained village, the plant is in fact 10 big factories. It has 22 streets, its own clinic, laundry, fire hall, technical library, police department, cafeteria and auditorium.

To build this modern giant 10 famous engineering firms and four big contractors employed a peak of 5,579 men and women at the site. From almost every quarter of the globe came the men and women to work on the project. The best engineers from Canada and many from the United States, the United Kingdom and Australia were employed. In addition, tens of thousands of man-hours went into preparing blueprints and making the components such as girders, pipes, towers, motors, valves and fabricated steel. By July 22, 1944, the last construction man had left the property, and the plant now employs a total staff of about 1,600 men and 235 women.

Hundreds of tires manufactured from synthetic roll off Canadian production lines for the armed forces. Into the making of a 56-inch webb go 1,600 cords which are not woven, but are webbed in latex solution.



To make its annual output of approximately 38,000 long tons of rubber the Polymer plant annually requires 400,000 tons of coal, more than 35,000,000,000 gallons of water, 19,000,000 imperial gallons of light end petroleum, 2,500,000,000 cubic feet of petroleum gas, 2,250,000 imperial gallons of benzol, 5,400,000 pounds of soap and enough brine to contain 18,000,000 pounds of salt. In addition great quantities of acids and other raw materials are used.

The plant is conveniently close to the salt mines at Sarnia, and the brine is transported in Polymer tank trucks. It is employed in the coagulation process to make buna-S.

War and Post-war Uses of Synthetic

Buna-S is used in passenger and small truck tires, and a percentage is used in large truck tires. Its development into use for footwear, wire and cable, tire repair materials and other items has reached an advanced stage. It is not as tough and durable as natural rubber in heavy tire casings. By adding a limited proportion of crude to the buna-S, a tough, reliable, military or truck tire can be made.

Butyl is used in inner tubes, anti-gas clothing and masks, hospital sheeting and life rafts.

For many purposes synthetic rubbers are proving superior to crude. Some synthetics will not become waterlogged, hence are used on underwater supports, rafts, life vests. Latex rubber coating for assault wire reduces the weight of the wire by as high as 80%. Other synthetics resist gases like lewisite, whereas crude rubber does not. Raincoats made of synthetic rubber can be sent to the cleaners and be relatively unharmed by cleaning fluids. Some, resistant to oil, grease and chemicals, are used in fuel hose, as lining for tanks containing acids, for footwear, paper and cardboard.

The post-war era will be characterized by a vast abundance of rubber. In part this will be neutralized by the great replacement demands which industries (like the automobile industry) which have been dormant during the war, will make to catch up. There will also be tremendous new demands in tomorrow's homes, automobiles, clothing and aviation development. Rubber flooring, mattresses, wallpaper, weather stripping and clothes are but a few of the future uses.

Facts and Figures

ARMED FORCES

STRENGTH—757,000

(more than)

	Pre-war	Present
Navy	1,700	90,000 (85,000 men, 5,000 women)
Army.....	4,500	465,000 (450,000 men, 15,000 women)
Air Force.....	4,000	202,000 (188,000 men, 14,000 women)
Total.....	10,200	757,000 (723,000 men, 34,000 women)

CASUALTIES—70,007

(to September 30, 1944)

ARMY

Fatalities.....	13,897
Presumed dead.....	319
Missing.....	1,651
Prisoners of war or interned*..	4,313
Wounded.....	30,842
TOTAL.....	<u>51,022</u>

MISSING, PRISONERS OF WAR OR INTERNED

Missing, prisoners of war or interned.....	5,362
Seriously or dangerously wounded or injured.....	965
TOTAL.....	<u>16,985</u>

NAVY

Killed on active service.....	1,141
Other deaths.....	197

TOTAL DEATHS.....

TOTAL DEATHS.....	<u>1,338</u>
Wounded or injured.....	350
Prisoners of war.....	87
Missing.....	225

TOTAL CASUALTIES.....

TOTAL CASUALTIES.....	<u>2,000</u>
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* The figure for prisoners of war includes 149 who have been repatriated or have escaped.

AIR FORCE

Deaths and presumed dead... 10,658

Canadian Forces in Action



BY the end of October the First Canadian Army had virtually completed its most important assignment since the beginning of the war—capture of the Scheldt estuary surrounding the port of Antwerp. The fighting has been increasingly heavy and, until the last week of October, the progress slow. It was often wholly an infantry battle of man against man. The water-soaked fields and partly-flooded marshlands which have been traversed by Canadian fighters are no place for tanks. By the end of the month the whole estuary had been cleared with the exception of enemy pockets remaining west of Breskens, on Walcheren Island and south of the Maas River. Allied ships were beginning to steam

into the estuary to begin the task of clearing mines, dredging the passage, and making the channel safe for allied supplies that will be relayed through Antwerp to the front.

Capture of the Scheldt approaches to Antwerp is an important achievement. Situated 40 miles up the Scheldt River, Antwerp is continental Europe's second largest port, with Hamburg ranking first. In 1937 Antwerp handled a record shipping tonnage of 25,100,000 tons, and in the peace years since 1925 the tonnage has only once dropped below 20,000,000. (The map on pages 32 and 33 shows the relative importance of Antwerp and other channel harbors both as commercial and supply ports in the offensive against Germany.)

Antwerp is of particular strategic importance now because of several main factors. In addition to its cargo-unloading capacity, it is on the shortest route from England to the northern section of the allied front. As it was captured intact, its installations can be put to immediate use as soon as the channels are cleared. The Belgian railway system has not suffered to as great an extent as French lines, and it will be able to handle supplies efficiently.

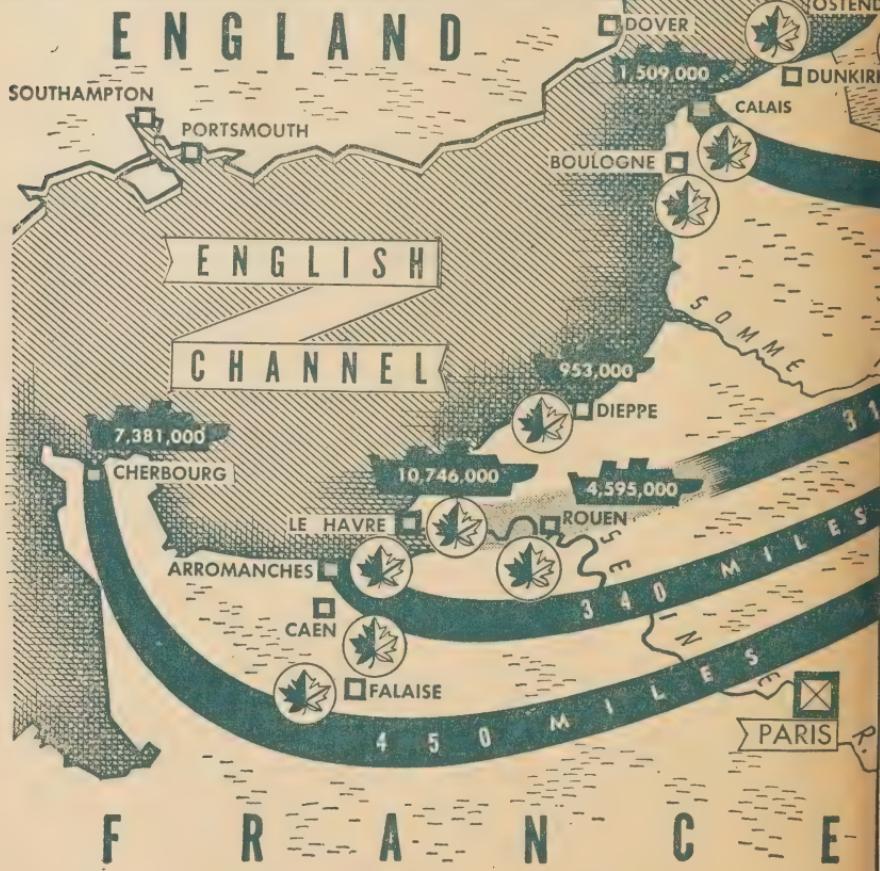
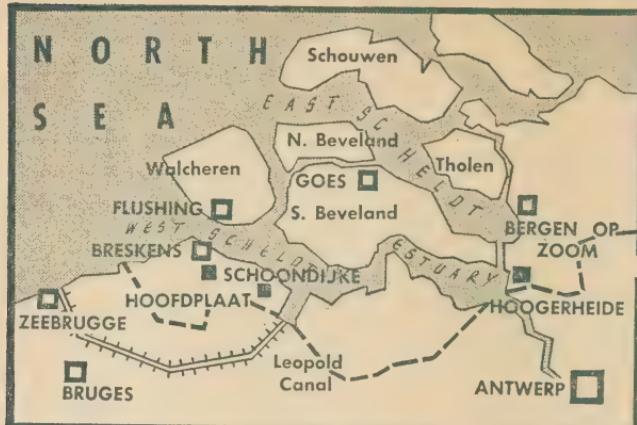
All the other French and Belgian ports that have been captured have been destroyed or considerably damaged by the Germans. Cherbourg, famous in pre-war days mostly as a passenger terminus and therefore able to dock the largest ocean-going vessels, has had to be rebuilt and can handle ships only up to the 10,000-ton Liberty or Victory ship size. Some of the other ports have been so badly wrecked that the allies are not bothering to put them in working condition.

The unbelievable story of how the allies kept their armies supplied in France before and even after the capture of Cherbourg was made known in October. Two pre-fabricated harbors, one for United States armies and one

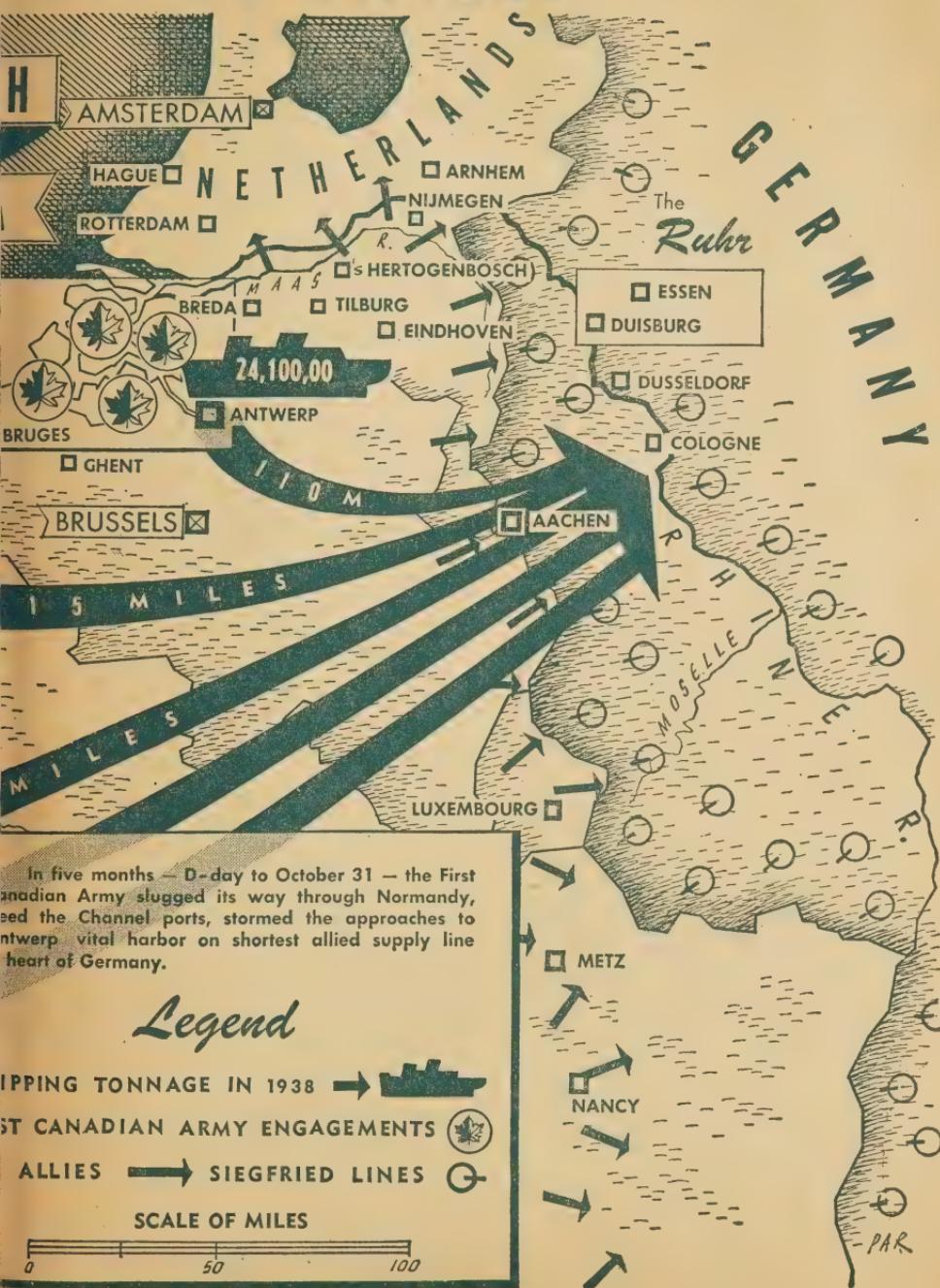
for the British group, were towed from England to France and set up immediately the beachheads had been secured. The worst channel storm in years wrecked the United States port before it was completed, but some use was made of it before it was wrecked. The British harbor at Arromanches is still, with Cherbourg, the main allied supply base on the continent. By the 28th day after the invasion more than 1,000,000 men, 183,500 vehicles and 650,000 tons of stores had been landed at the artificial harbors.

To keep an extended and expanding front supplied, the allies must have short, speedy supply lines. Hundreds of miles of pipeline have been laid from the Normandy ports to various points behind the front; the battered French railway system has been improved and pushed to fullest capacity, and streams of trucks haul provisions along speedily made roads. Difficulties of land transportation in France are considerable, however, and even the French port closest to the front is more than 100 miles farther away from the armies than Antwerp. It has been the job of the First Canadian Army to open the front door to Germany.

ANTWERP-STRATEG



KEY TO VICTORY



At the beginning of October the First Canadian Army was preparing to send its full weight against enemy positions in the Scheldt area. Canadian troops had crossed the Leopold Canal and were starting their drive to clear the south bank of the estuary from Antwerp to Zeebrugge. In the other main sector north of Antwerp, the object was to gain control of the causeway leading from the mainland to South Beveland Island and thence take that island and Walcheren where the Flushing guns guarded entrance to the estuary.

For many days the Canadian hold on the Leopold Canal approach was perilously narrow, but somehow strong German counter-attacks were beaten off. Ammunition and food were ferried across the canal by night.

An amphibious operation on the shore of Scheldt, near Hoofdplaat about 33 miles west of Antwerp, brought considerable relief to the troops inland. In the early hours of October 9 amphibious troop-carriers brought ashore three regiments of D-day veterans: Highland Light Infantry, Stormont, Dundas and Glengarry Highlanders and the North Nova Scotia Highlanders. These

men spread out along the coast and took Breskens, Schoondijke and Fort Frederik-Hendrik. They were also able to push inland to combine with the forces that were fighting seven miles south to cut the Scheldt area in half. The consolidated forces pushed together across the Atlantic end of the sector.

Through the dike-combed Scheldt pocket there was little opportunity for army tactics or manoeuvres. Canadians fighting there said the going was even tougher than at Caen. Enemy mortar and artillery fire were both extremely heavy. Advance is difficult as roads are mostly alongside or on top of dikes where the men are exposed.

Their most prized possessions were flame throwers. When they were fired on by the Germans, the flame throwers were put into action, and while the enemy combatted the flames the position was overrun. Many times allied artillery could not be used for fear of shelling Canadian troops.

Dovetailing with the battle south of the Scheldt was the Canadian Army's push north of Antwerp. On the day that the estuary troops seized Breskens immediately across from Flushing, the fall of Esschen climaxed

an 11-mile advance. Sappers and infantry working together in the dark to clear mines, booby traps and felled trees from the roads and to build bridges opened the way for Canadian tanks to advance. Capture of Esschen greatly strengthened the Canadian grip on the causeway to South Beveland. Control of the narrow neck of marshland was gradually gained and they began pushing into the island.

A second series of amphibious landings were made by British troops of the First Canadian Army in the grey misty dawn of October 26. Ferried from the south bank to the opposite shore, they took the Germans completely by surprise. Close watch was being kept on the entrance to the estuary so that no landing craft could pass through, but the assault vehicles used were brought overland. They are a combination truck and barge which move as easily through water as on land. Exploiting their initially unopposed landings, the forces pushed inland and within a few days had been joined by troops invading from the mainland. By the end of October the whole of South Beveland had been taken and Walcheren Island was being subjected to heavy attack.

The British Second Army striking west from its Nijmegen salient into's Hertogenbosch and Tilburg has helped to bring the Scheldt campaign to a speedy close. Units of the First Canadian Army driving north have been combining with the British to push the remnants of the enemy across the Maas River.

At the end of October it was announced that United States troops were fighting under Canadian command and were taking part in the advance on the northern section of the Netherlands. When its structure was first announced in August, 1944, the First Canadian Army included British, Netherlands, Belgian and Polish forces as well as Canadians. Since that time a Czech brigade of refugees trained in the United Kingdom as well as the United States units have been added. In the end-of-the-month thrust through the Netherlands it was Canadians who took Bergen op Zoon, Poles who captured Breda, and British who seized Roosendaal—but all were in the First Canadian Army, which is under Canadian command.

During October it was learned that Canadian engineers helped in the evacuation of survivors

of the First British Airborne Division's attack on Arnhem. They manned assault boats which ferried the troops across the Rhine and brought back a total of some 2,500 men. Almost 90% of the men rescued were helped by Canadians.

In Italy the Canadians serving with the British Eighth Army were in heavy action throughout October. They are pushing ahead in the Adriatic sector. One of their toughest assignments was to drive a bridgehead over the swift Savio River which runs northward through Cesena into the Adriatic. Two battalions established a foothold during a torrential rainstorm. All through the next day they had to lie flat in pools of mud to escape discovery by the Germans. When reinforcements were brought in they were able to establish a firmer hold across the river and begin pushing on.

Air Force.—With the expansion and consolidation of the British Second Army's Nijmegen salient, Royal Canadian Air Force Spitfire and Typhoon squadrons have advanced from their Belgian bases and are now operating from airfields in the Netherlands.

During the week ended October 5, R.C.A.F. Spitsfires shot down 34 German planes for a total of 860 enemy aircraft downed by Canadian airmen since the beginning of the war. Among the planes destroyed by Canadians in October was a ME-262, a jet-propelled aircraft. This was the first of its kind to be downed by Royal Air Force or R.C.A.F. pilots.

Up to the beginning of October the 21-month-old Canadian bomber group had dumped 75,086 tons of bombs on Europe—a record unequalled by any other group in the R.A.F. bomber command in the same period. The R.A.F. and R.C.A.F. dropped 67,200 of a total of 125,000 tons of explosives rained by the allies during October.

A record for the number of Canadian aircraft despatched against a single target was set in the Duisburg raid on October 14 and 15 when more than 500 R.C.A.F. Halifaxes and Lancasters helped deliver the heaviest weight of bombs ever dumped on one city in so short a time—10,000 tons. It was also the first time that more than 500 sorties were flown by Canadian bombers during 24 hours. Ground crew worked without rest to put the

planes into the air, and several crews made two trips, with little rest between, to fly a total of 2,000 miles in 18 hours.

Duisburg, the largest inland port in Europe, may be compared in many ways to the port of Montreal, although its population is less than half. Nowhere else in Europe is there so great a transference of goods between rail and river, and a huge railway network surrounds the port. Other important industrial cities, particularly those in the Ruhr Valley, were also attacked.

Now that German submarine bases along the French coast have been virtually annihilated, the south coast of Norway has become the focal point for allied attacks against U-boat pens. Bergen is now one of the main advance bases, and R.C.A.F. heavy bombers raided its installations during October.

Enemy shipping along the Norwegian coast was a major target during October. R.C.A.F. rocket-firing Beaufighters of the coastal command participated in a convoy attack off Norway, and two merchant vessels were heavily damaged, probably sunk. Another attack was made against enemy shipping in the Skagerrak, and several ships were set ablaze.

One of the latest powerful allied weapons to be launched against Germany is the six-ton "earthquake bomb." Its main advantages are its tremendous blast effect and the fact that it penetrates into the earth and does not explode until it is inside or under the target. These bombs were used in the air attack on the 12-foot concrete roofs of submarine pens at Brest. During October R.C.A.F. pilots were part of a hand-picked Lancaster squadron which attacked the Sorpe dam with "earthquakes."

During October it was announced that two all-Canadian squadrons for transport action against the Japanese in Burma and other Far Eastern war theatres are being formed in India. The R.C.A.F. contribution will consist only of air crew. Also serving in India is a Vengeance divebomber squadron which includes 10 Canadians. Its work was outstanding in the allied attack on the Imphal area when the Japanese were driven back across the Burma border.

The close support R.C.A.F. bombers have given ground troops, particularly in the breakthrough from Caen to Falaise

and attacks on the Channel ports, was praised during October by Air Chief Marshal Sir Trafford Leigh-Mallory, formerly General Eisenhower's air commander and now chief of the southeast Asia air command. He said that the Canadian fighter squadrons were the spearhead of the allied air forces in the Normandy invasion. Referring to the roles of dominion air forces and various European groups serving in the R.A.F., Sir Trafford said the R.C.A.F. had done "more than any of the others."

Navy.—The part taken by ships of the Royal Canadian Navy in protecting two prefabricated harbors that were towed to the Normandy beaches in the early days of June was disclosed during October. Specifically requested by high-ranking naval officers were eight sturdy, old-type corvettes, veterans of Atlantic convoy service—the *Regina*, *Camrose*, *Alberni*, *Prescott*, *Mayflower*, *Calgary*, *Rimouski* and *Drumheller*.

It was the job of these corvettes to fight off any enemy attacks on the slow-moving procession of tugs that were towing huge sections of steel and concrete at a pace that never ex-

ceeded three knots, just a brisk walking speed. Not one section of the portable harbors was lost. Speedy German E-boats and submarines were on the alert, and several attacks had to be beaten off. Two of the Canadian corvettes have been lost—the *Regina* and the *Alberni*. Both went down in a matter of seconds.

Also on hand to help fight off enemy intruders and clear the sea lanes to France was a group of Canadian minesweepers.

The threat of renewed submarine activity in the Atlantic was raised in October, and warnings were issued by Navy Minister Macdonald and First Lord of the Admiralty A. V. Alexander. With capture or destruction of the submarine pens at Lorient, St. Nazaire, Brest and Bordeaux, the Germans have had to move north. The Norwegian coast has now become the main base for German U-boats. Allied ships and planes are directing considerable attention to the south coast of Norway.

Sinking of a German U-boat by the Canadian destroyers, H.M.S.C. *Ottawa* and *Kootenay*, assisted by a Royal Navy corvette, H.M.S. *Statice*, was announced during October. In a

splendid piece of teamwork last July the three ships unloaded quantities of depth charges and were rewarded by seeing pools of oil rise to the surface.

Action in which the Canadian frigates H.M.C.S. *Saint John* and *Swansea*, brought about the destruction of a submarine was also made known in October. The depth charge attack lasted for several hours before oil and wreckage appeared as confirmation of its success. This was the third time the *Swansea* had participated in a U-boat sinking.

Stories of the exploits of some of Canada's battle-tried ships are gradually being released. H.M.C.S. *Iroquois*, a Tribal class destroyer, veteran of the Murmansk convoy run, off shore bombardment and heavy Channel fighting, has established a record for destroyers. In 28 days of August it steamed some 10,000 miles, fired more than 3,500 rounds of heavy ammunition and aided in sinking 23 enemy ships.

The corvette, H.M.C.S. *Camrose*, has also had a career that is the envy of many ships. In addition to Atlantic escort duty, its activities have included runs in the Bay of Biscay, service in the Mediterranean and invasion work in North Africa and Nor-

mandy. The *Camrose* has also participated in the sinking of a German blockade runner and shared credit for a "probable" sinking of a German U-boat.

Canada's two large infantry landing ships, H.M.C.S. *Prince David* and *Prince Henry*, have now taken part in three invasions. The last of these was the landing of British troops on Greece and the Aegean Islands. They also took allied forces across the Channel on D-day and helped with the invasion of Southern France.

First of two British-built cruisers to be added to the Canadian navy is H.M.C.S. *Uganda*, which was commissioned on Trafalgar Day, October 21. An 8,000-ton medium cruiser, the *Uganda* was originally commissioned late in 1942 and served with the Royal Navy during the Sicilian and Italian landings. The ship is of the *Uganda* class, 549 feet long, mounts nine six-inch guns, eight four-inch anti-aircraft guns and a considerable number of smaller guns.

Another commissioning during October was that of H.M.C.S. *Humberstone*, a Castle class corvette built in the United Kingdom for the Canadian navy.



War Diary

Oct. 1. British Eighth Army takes Savignano on Rimini-Bologna highway. British forces land on Kythera and two other Greek islands.

Oct. 2. Canadians drive forward four miles northwest of Turnhout in Scheldt area. United States First Army makes two-mile gain into Siegfried Line near Aachen. 2,500 allied planes blast Germany. Russians and Partisans fighting side by side in Yugoslavia.

Oct. 3. United States First Army drives second gap into Siegfried Line to depth of four miles. Crete under allied siege. Red Army announces second front drive in Yugoslavia. Japanese advancing on Foochow, Chinese port, in surprise landings in Fukien province. Balikpapan, Borneo oil centre, bombed.

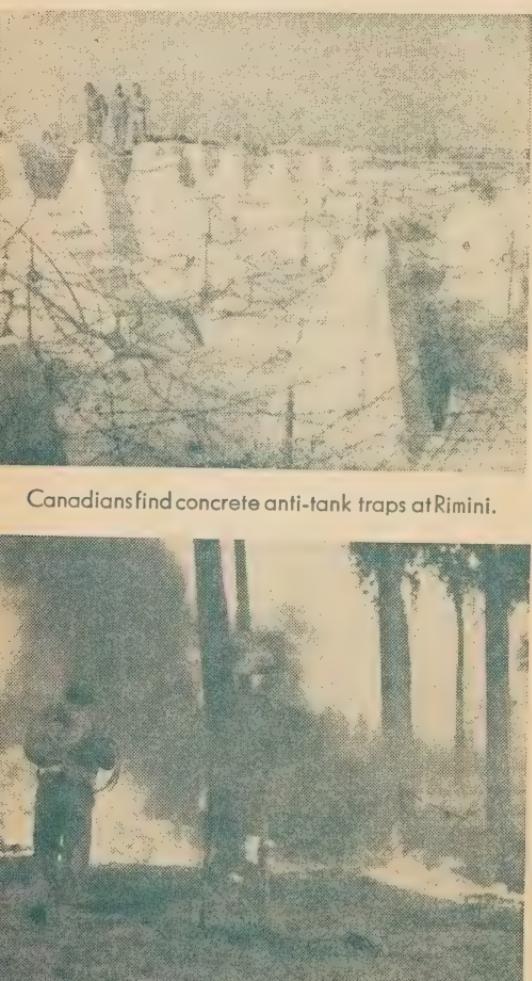
Oct. 4. R.C.A.F. bombs Bergen, Norway. British take Patras, Greece. Announced first action of Canadian-manned aircraft carrier, H.M.S. *Nabob*, off Norwegian coast in August. Russians and Partisans advance 27 miles in one day and are within 16 miles of Belgrade. Japanese six miles from Foochow.

Oct. 5. R.C.A.F. Spitfires destroy 34 enemy aircraft in week. Canadians take last ridge overlooking Rimini.

Oct. 6. End of truce for evacuation of Dunkirk. Canadians have firm bridgehead over Leopold Canal. Berlin bombed three times in 24 hours. United States breach south of Aachen seven miles wide at base. British take Rion to seal off Gulf of Corinth.

Oct. 7. 16,000 tons of bombs dropped from 7,000 allied planes on German targets for strategical bombing record.

Oct. 8. Canadians capture Hoogerheide, 14 miles north of Antwerp. Aachen entered. Red Army advances 62 miles on 175-mile front through Lithuania in four-day offensive. Russians 29 miles from Memel, important Baltic port.



Canadians in Belgium use "Lifebuoy" flame-thrower.

for October

Oct. 9. Canadians in amphibious operation on south bank of Scheldt near Hoofdplaat, 33 miles west of Antwerp. Churchill and Stalin confer in Moscow. Draft of Dumbarton Oaks peace league plan published. Allies 10 miles from Bologna. United States carrier planes attack Ryukyu Islands, 200 miles south of Japan. 89 enemy planes downed and 58 ships hit.

Oct. 10. Corinth seized by British and Greek forces. Carrier planes raid Luzon in Philippines. Oil refineries at Balikpapan, Borneo, damaged.

Oct. 11. Aachen under heavy seige. Russians reach East Prussian border. Bulgaria accepts preliminary peace demands of allies. First U-boat sinking of merchant ship in Atlantic in many months reported.

Oct. 12. Canadians and British advance three miles in Adriatic sector. Heaviest United States air raid of Italian campaign on Bologna. Red Army ready to cross into East Prussia on 110-mile front. United States planes raid Formosa with two-day score of 396 planes downed and 63 surface ships sunk or damaged.

Oct. 13. King George decorates eight Canadians in Netherlands. Fall of Riga, capital of Latvia. Partisans and Russians on outskirts of Belgrade.

Oct. 14. Allied raid on Duisburg and Cologne. Athens and Piraeus freed. Formosa bombed by Superfortresses.

Oct. 15. Canadian beachhead forces joined by troops advancing from east end of Leopold Canal cut Scheldt pocket in half. Record allied raids on Duisburg drop 10,000 tons in two attacks. 500 R.C.A.F. heavy bombers participate for record number of Canadian planes over single target. Sorpe dam bombed with 12,000-pound bombs. Hungarian government sues for peace. Russians take Petsamo, Arctic port in Finland. Germans announce death of Rommel.

R.C.A.F. of north Ireland patrol use Sunderlands.



Ever-popular mail jeep delivers at front line.



R.C.N. welcomed at Piraeus, port of Athens.



War Diary



Winnipeg sailors on leave visit Coliseum in Rome.



Oxygen bottles filled—R.C.A.F. Hollandairfield.



Oct. 16. United States forces complete encirclement of Aachen. British naval force brings reinforcements to Piraeus. New pro-Nazi government formed in Hungary as Admiral Horthy ousted. Red Army within 50 miles of Budapest.

Oct. 17. British Second Army in eastward offensive. Continued raids on Formosa and Luzon.

Oct. 18. British warships seize Scarpanio Island on Dodecanese. Greek government returns to Athens. British eight miles from German border. Reds fighting in Czechoslovakia on 170-mile front. Seven Carpathian passes taken. From October 9 to 18, 1,333 Japanese planes downed, 86 ships sunk, 127 damaged.

Oct. 19. Canadians enter Breskens. Germans abandon Thebes. General MacArthur leads invasion of Leyte Island in Philippines. Fall of Tiddim, Jap supply base in Burma.

Oct. 20. Canadian Army advances five miles north of Antwerp. Fall of Aachen. Belgrade freed—14th European capital to fall to allies. Canadian bridgehead established over Savio River in Italy. Fall of Debrecen, third city of Hungary. Moscow conference ends.

Oct. 21. Canadians take Cesenatico, 18 miles south of Ravenna. Cesena occupied. United States forces have advanced average of four miles on Leyte Island.

Oct. 22. Canadians take Breskens and Esschen for gain of 11 miles in two days. British Second Army begins drive on 's Hertogenbosch. Russians enter Norway on 40-mile front. Greek island of Lemnos taken. Tacloban, capital of Leyte, captured. Announced British carrier planes raid Nicobar Islands.

Oct. 23. Canadians take Schoondijke. Stalin announces Russian army 18 miles inside East Prussia on 87-mile front. Memel surrounded. Allies recognize de Gaulle government in France. British

City of Edmonton squadron receives home parcels.

for October

Eighth Army takes Cervio, 12 miles south of Ravenna. British push through Thermopylæ, Greece. Japanese fleet sighted and great naval battle begins with United States fleet.

Oct. 24. Canadians driving across South Beveland causeway are one and a half miles into the island. Third airfield taken on Leyte. Japanese three-pronged naval attack off Philippines and Formosa. Bridgehead on Samar Island near Leyte.

Oct. 25. Allies resume diplomatic relations with Italy. Germans completely cleared from Transylvania. Russians take Kirkenes, Norwegian Arctic port. Superfortresses bomb Omura airbase in Japan. Japanese fleet routed, 58 vessels hit of which 24 sunk, to six United States ships.

Oct. 26. First Canadian Army takes Oostburg. Canadians with British Eighth Army take Forlimopoli on Bologna-Rimini highway.

Oct. 27. British of First Canadian Army make amphibious landing on South Beveland Island. British Second Army takes Tilburg. First Canadian Army takes 82,744 prisoners to date, all allies 637,544.

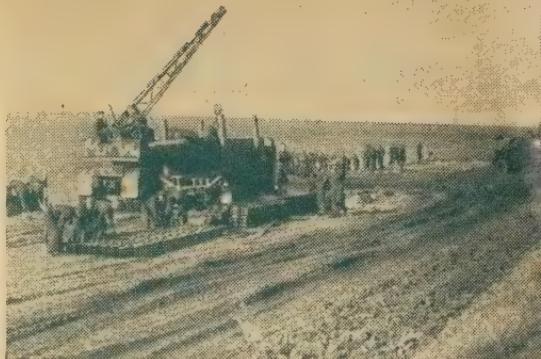
Oct. 28. Canadians take Bergen op Zoon. 's Hertogenbosch in British hands. General Stilwell recalled from China-Burma-India command. Practically all Samar Island in United States control.

Oct. 29. Polish troops with Canadian Army take Breda. Canadians half-way along South Beveland from causeway, link with beachhead. *Tirpitz* bombed by 12,000-pound bombs. Bulgarian peace terms published.

Oct. 30. Canadians overrun South Beveland Island. Fall of Roosendaal to British of First Canadian Army. Two-thirds of Leyte in United States hands.

Oct. 31. North Beveland invaded by small group of Canadians. Two raids on Cologne for total of 9,000 tons in four days. Red Army 43 miles from Budapest.

R.C.A.F. men dig for cover in flat Holland countryside.



R.C.E. corps prepares to cross strategic Scheldt.



Canadian anti-tank vehicle fires in Cesena.



Facts About N.R.M.A. Soldiers

ALL members of Canada's navy and air force and of its army overseas are volunteers. Of the more than 450,000 men on service with the army, either overseas or in Canada, more than 390,000 have volunteered for general service anywhere in the world. The remaining 60,000 are men who have been enrolled under the National Resources Mobilization Act for compulsory military training and service in Canada and in certain adjacent territories such as Newfoundland and Jamaica, which have been designated by order-in-council. Such men may be despatched to other areas only by further orders-in-council. In addition to this 60,000, there are about 8,500 N.R.M.A. soldiers who, although on army strength, are on extended leave or duty from depots.

The total number of men en-

rolled under the N.R.M.A. between March, 1941, and October, 1944, was 150,000. This compares with more than 300,000 men who volunteered for general service in the same period. Of the total 150,000 enrolled men, 42,000 enlisted for general service after their enrolment, and 6,000 transferred as volunteers to the navy or air force. Discharges, etc., accounted for 33,500.

In 1944 to the end of September, nearly 15,000 men were enrolled under the N.R.M.A. In the same period 10,000 enrolled men volunteered for general service. Since the invasion of western Europe began on June 6, 1944, voluntary enlistments for overseas service on the part of N.R.M.A. men have been greater in number than the enrolments of compulsory service men during the same period, as shown in the following table:

MONTH	Enrolments Under N.R.M.A.	Voluntary Enlistments From N.R.M.A.	Excess of Voluntary Enlistments Over Enrolments
June.....	1,500	2,975	1,475
July.....	1,350	1,350	...
August.....	1,225	1,350	125
September....	1,050	1,350	300
October.....	1,075	850	-225
Total....	<u>6,200</u>	<u>7,875</u>	<u>1,675</u>

N.R.M.A. MEN ON STRENGTH

AND

ESTIMATED NUMBER SUITABLE FOR INFANTRY*

At September 30, 1944

Military Districts Where Now Stationed	Operational Units		Non-operational Units		Training Stream		Depot Appraisal, Placement and Relocation Wings		Total	
	Total	Suitable for Infantry Included	Total On Strength	Suitable for Infantry Included	Total On Strength	Suitable for Infantry Included	Total On Strength	Total On Strength	Total On Strength	Suitable for Infantry Included
Military Districts No. 1, 2 and 3, including National De- fence Headquarters, Camp Borden and Petawawa (On- tario)	1,500	1,300	4,400	2,300	5,500	3,900	300	11,700	11,700	7,500
Military Districts No. 4 and 5 (Quebec)	200	200	5,800	3,000	2,500	1,800	1,000	9,500	9,500	5,000
Military Districts No. 6 and 7 (Maritimes)	4,700	3,900	3,300	1,700	1,300	900	400	9,700	9,700	6,500
Military Districts No. 10, 11 and 13 (Prairies)	2,200	1,900	1,300	700	1,300	900	200	5,000	5,000	3,500
Pacific Command (British Columbia)	17,900	14,900	700	300	600	500	300	19,500	19,500	15,700
Total in Canada	26,500	22,200	15,500	8,000	11,200	8,000	2,200	55,400	55,400	38,200
Adjacent Territories	4,600	3,800	....	....	....	....	....	4,600	4,600	3,800
Total	31,100	26,000**	15,500	8,000	11,200	8,000	2,200	60,000	60,000	42,000

*It should be noted that this table shows the districts where the men are now serving, not where they were enrolled. Excluding extended leaves from 45 depots. Figures not adjusted for part of Quebec included in Military District No. 3 and part of Ontario included in Military District No. 10.

**This group includes most of the 16,000 estimated as trained infantry, of whom 8,000 could be ready for combat at an early date.

Nearly 975,000 men have entered all three fighting services during the war. The number of N.R.M.A. men still on the strength of the army who have failed to volunteer for service anywhere in the world is about

7% of this total. Following is a summary of N.R.M.A. enrolments, conversions to general service, discharges, etc., from the time men were first enrolled for the duration of the war, which was March, 1941:

	Enrolments	Conversions to General Service	Conversions to Other Services	Discharges, etc.	Total	Strength at end of year
1941 (commencing March).....	31,500	7,500	4,200	3,300	15,000	16,500
1942.....	69,500	18,000	1,300	8,200	27,500	
Total including 1942....	101,000	25,500	5,500	11,500	42,500	58,500
1943.....	34,000	6,500	300	11,000	17,800	
Total including 1943....	135,000	32,000	5,800	22,500	60,300	74,700
1944 (to end of September).....	15,000	10,000	200	11,000	21,200	
Grand total.....	150,000	42,000	6,000	33,500	81,500	68,500 (at end of September)
On extended leave or duty from depots.....						8,500
Net effective strength (at end of September).....						60,000

Of these 60,000 it is estimated that 42,000 are of an age and medical category suitable for combat service in the infantry. (For a breakdown by districts and type of formation of N.R.M.A. men now on strength and of those suitable for infantry, see page 45.) Some 16,000 are already trained as infantry, about 8,000 of whom are sufficiently trained to be ready for combat at an early date. The remaining 26,000, who are of an age and category suitable for

infantry, are presently on the strength of the units of the other arms and services where they are undergoing training or engaged in duties related to the continuing but diminishing requirements for the defence of Canada and certain outlying territories for which Canada has assumed certain responsibilities.

The year of enrolment of those men still on strength as N.R.M.A. men at the end of September, 1944, was as follows by military districts:

Military Districts Where Enrolled	1941	1942	1943	1944	Total
No. 1, 2 and 3 (Ontario)	900	6,800	4,900	2,400	15,000
No. 4 and 5 (Quebec)	2,900	8,800	6,100	5,000	22,800
No. 6 and 7 (Maritimes)	400	1,800	1,500	600	4,300
No. 10, 12 and 13 (Prairies)	1,700	6,200	4,200	1,700	13,800
Pacific Command (British Columbia)	300	1,800	1,200	800	4,100
Total	6,200	25,400	17,900	10,500	60,000*

*Figures not adjusted for part of Quebec included in M.D. 3 and part of Ontario included in M.D. 10.

The 42,000 suitable for employment as infantry are by district of enrolment as follows:

Military Districts Where Enrolled	Number
No. 1, 2 and 3 (Ontario)	10,250
No. 4 and 5 (Quebec)	16,300
No. 6 and 7 (Maritimes)	2,600
No. 10, 12 and 13 (Prairies)	10,000
Pacific Command (British Columbia)	2,850
Total	42,000*

*Figures not adjusted for part of Quebec included in M.D. 3 and part of Ontario included in M.D. 10.

The 8,500 on extended leave or duty from depots were engaged as follows:

(In all tabulations figures are given in round numbers.)



The total number of training aircraft on the strength of the British Commonwealth Air Training Plan as at August 31, 1944, was 8,605. At the peak of the plan more than 11,000 aircraft were employed on training. For the different types of training, such as elementary, bombing and gunnery, wireless, operations and transportation, more than 20 different types of planes were used.

Farm duty	200
Farm leave—	
Compassionate	5,400
Harvest	500
Industry	400
Logging	100
Mining	500
Other similar leaves	1,400
Total	8,500

Languages of the 60,000 N.R.M.A. men now on strength are as follows:

English only	17,800
French only	12,100
English and French	14,400
Foreign languages*	15,700
Total	60,000

* Generally able to speak either English or French also.

ESTIMATED MANPOWER

14 Years

Population Class	June 1, 1939				June 2, 1941			
	Males	Females	Total		Males	Females	Total	
			No.	%			No.	%
Total population, 14 years of age and over ..	4,259	4,000	8,259	100.0	4,385	4,130	8,515	100.0
Total in armed forces or gainfully occupied	3,030	663	3,693	44.7	3,570	746	4,316	50.7
Armed forces (1).....	10	....	10	.1	305	1	306	3.6
Total gainfully occupied (2).....	3,020	663	3,683	44.6	3,265	745	4,010	47.1
Non-agricultural industry total.....	1,810	663	2,473	29.9	2,209	745	2,954	34.7
(a) Wage and salary workers in war industry (3).....	....	....	....	....	420	40	460	5.4
(b) Wage and salary workers in civilian industry	1,440	543	1,983	24.0	1,429	589	2,018	23.7
(c) Employers, own accounts and no pays (4).....	370	120	490	5.9	360	116	476	5.6
Agriculture—males only	1,210	....	1,210	14.7	1,056	....	1,056	12.4
Farm women, 14-64 years of age (5).....	....	800	800	9.7	....	788	788	9.2
Students.....	318	316	634	7.7	293	304	597	7.0
Unemployed (6).....	911	2,221	3,132	37.9	{ 169 353	111 2,181	280 2,534	3.3 29.8

NOTE:—The above estimates are based on the most recent information obtainable from the Dominion Bureau of Statistics and other official sources. In some cases (such as domestic servants, agricultural males, farm women, and employers, own accounts and no pays) they are subject to a possibility of considerable error, as little statistical information is available. All are subject to revision.

1. Includes prisoners of war and persons missing but still on strength. Excludes persons enlisted but on leave and engaged in civilian occupations.
2. Does not include women gainfully occupied on farms or in farm homes, who are included with farm women. Does not include wage and salary workers who are temporarily unemployed because of "no job" or "lay-off."

DISTRIBUTION (In Thousands)

and Over

June 1, 1943				June 1, 1944			
Males	Females	Total		Males	Females	Total	
		No.	%			No.	%
4,503	4,258	8,761	100.0	4,540	4,325	8,865	100.0
3,887	1,029	4,916	56.1	3,930	1,086	5,016	56.5
701	27	728	8.3	748	36	784	8.8
3,186	1,002	4,188	47.8	3,182	1,050	4,232	47.7
2,236	1,002	3,238	36.9	2,182	1,050	3,232	36.4
870	230	1,100	12.6	780	195	975	11.0
1,066	662	1,728	19.7	1,082	745	1,827	20.6
300 950	110	410 950	4.6 10.9	320 1,000	110	430 1,000	4.8 11.3
....	760	760	8.7	....	775	775	8.8
230	246	476	5.4	212	230	442	5.0
46	29	.75	.9	38	24	62	.7
340	2,194	2,534	28.9	360	2,210	2,570	29.0

3. Includes employment on direct and indirect war production and construction, and the war content of employment in ancillary industries.
4. "Own accounts" are persons who carry on their business without assistance of employees. "No pays" are mainly family workers receiving no fixed money payment.
5. Since it is impossible to measure statistically the amount of farm work done by women, all women residing on farms are here included except students, women 65 years of age and over and those gainfully occupied outside the farm.
6. In 1943 and 1944 the number of unemployed was accounted for almost entirely by persons temporarily out of work while moving from one job to another.

Canada Welcomes Peace League Blueprint

AT a conference held from August 21 to October 7, 1944, at Dumbarton Oaks, Washington, D.C., delegations from the four largest allied powers—the United Kingdom, United States, Soviet Union and China—discussed the subject of an international organization for the maintenance of peace and security.

In commenting on the statement of tentative proposals issued at the end of the conference Prime Minister King of Canada, on October 9, 1944, said that the Canadian government welcomed the very large measure of agreement which had been reached among the representatives. He stated:

"Canada is vitally concerned that an effective international organization should be established for the maintenance of peace and security. It is generally recognized that agreements between the countries which have taken part in the discussions in Washington is an essential condition of success. Without the full participation of the greatest countries it would be impossible to establish an international system which could effectively maintain the peace of the

world and achieve the necessary co-operation, not only in adjusting disputes and preventing war, but also in solving the great international problems of human welfare.

"The statement issued today deals with matters which deeply affect the future of every Canadian. I commend it to the careful and earnest study of the people of Canada."

Establishment of an international organization was proposed under the title of the United Nations which would be four-fold in purpose:

1. To maintain international peace and security, and to that end to take effective collective measures for the prevention and removal of threats to the peace and for the suppression of acts of aggression or other breaches of the peace and to bring about by peaceful means settlement of international disputes.
2. To develop friendly relations among nations and to take other appropriate measures to strengthen universal peace.

3. To achieve international co-operation in the solution of international economic, social and other humanitarian problems.
4. To afford a centre for harmonizing the actions of the nations in the achievement of these common ends.

Membership would be open to all peace-loving states, and such members would undertake to fulfil the obligations laid out in the charter of the organization, that is: Disputes would be settled by peaceful means; threats or use of force in international relations would be ruled out; every assistance would be given to the organization in any of its actions undertaken in accordance with the charter; no aid would be given to any state against which action was being undertaken by the league.

Physically the organization would consist of four principal organs: A general assembly, a security council, an international court of justice and a secretariat.

General Assembly.—All members of the organization would be members of the general assembly and would have a number of representatives to be specified in the charter. This

assembly would have the right to consider the general principles of co-operation in the maintenance of international peace and security, including the principles governing disarmament and the regulation of armaments, and to discuss any questions relating thereto brought before it by any member of the organization or the security council. Questions leading to action would be referred to the security council by the assembly, either before or after discussion.

On recommendation of the security council the assembly would be empowered to admit new members and to suspend existing members for infractions of the principles laid down in the charter. The assembly would also apportion expenses and approve budgets. It would make recommendations and initiate studies for the promotion of international co-operation in political, economic and social fields. It would receive and consider annual and special reports from the security council and other bodies of the organization.

Each member of the organization would have one vote in the general assembly. This assembly would meet in regular

annual sessions and in such special sessions as it might require. It would be empowered to adopt its own rules and procedure for its successful functioning.

Security Council.—Primary responsibility for the actual maintenance of peace and security would be assigned to a security council. This council would consist of one representative of each of 11 members of the organization. Representatives of the United States, the United Kingdom, the U.S.S.R. and China, and, in due course, France, would have permanent seats. The general assembly would elect six states to fill the non-permanent seats. These six states would be elected for a term of two years—three would retire each year and not be immediately eligible for re-election.

This council would be so organized as to be able to function continuously. It would be empowered to investigate any situation which might lead to international friction to determine whether its continuance were likely to endanger world peace. Any state, whether a member of the organization or not, might bring any dispute to the attention of the assembly or council.

Every possible method to seek a solution by negotiation, mediation, conciliation, arbitration or judicial settlement would be exploited to the full. Parties to the dispute would be encouraged to settle it between themselves.

If such settlement were impossible, the question would be referred to the security council which would decide whether it was of a nature likely to be harmful to the peace of the world.

International Court of Justice.—Justiciable disputes would be referred to the international court of justice, which body would constitute the principal judicial organ of the organization.

Threats to the Peace.—In general the security council would determine the existence of any threat to the peace, breach of the peace or act of aggression and would make recommendations or decide on the measures to be taken to maintain or restore peace. It would be empowered to determine what diplomatic, economic or other measures not involving the use of armed forces should be employed to give effect to its decisions and to call on members of the organization to apply such meas-

ures. Such measures might include complete or partial interruption of communications and severance of economic and diplomatic relations. Should these be considered inadequate, further action might include demonstrations, blockade and other operations by air, sea or land forces of the members.

All members of the organization would make available to the security council on its call and in accordance with special agreements, armed forces, facilities and assistance necessary for the purpose of maintaining security. In order to enable urgent military measures to be taken by the organization there would be held immediately available for use by the members national air force contingents for combined international enforcement action.

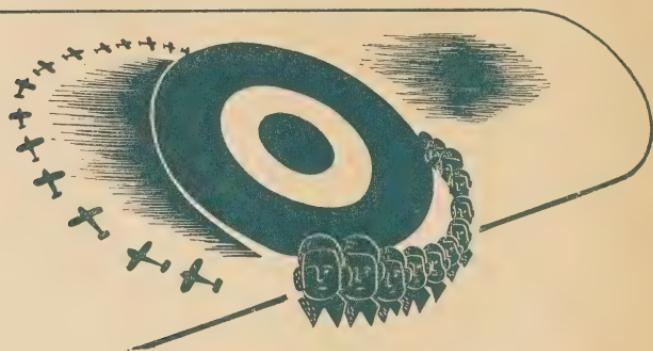
Plans for the application of armed forces would be made by the security council with the assistance of a military staff committee whose function would be to advise and assist the council on all questions of its military requirements and on the disposal of all forces placed at its disposal. This committee would be composed of the chiefs of staff of permanent members of the security council or their representatives.

Economic and Social Council.—With a view to establishing conditions of stability and well-being which are necessary for peaceful and friendly relations among nations, the organization would facilitate solutions of international economic, social and other humanitarian problems and promote respect for human rights and fundamental freedoms. Responsibility for the discharge of this function would be vested in the general assembly and, under the authority of the assembly, in an economic and social council whose members would be elected by the assembly.

The Secretariat.—There would be a secretariat comprising a secretary-general and such staff as might be required. The secretary-general would be the chief administrative officer of the organization—elected by the assembly on recommendation of the council and for such term and under such conditions as specified in the charter.

Mr. King pointed out that the proposals framed at Dumbarton Oaks are but the first stage in the development of a draft charter for consideration by all the United Nations.

Air Training in Canada



COMBAT aircraft of the British Commonwealth today are writing in battle skies the success story of the British Commonwealth Air Training Plan. Canada, with its broad fields and clear skies, has been the ideal place for the training of air crew, and the Royal Canadian Air Force has ably administered the plan.

The quadrilateral agreement under which the B.C.A.T.P. was established was reached on December 17, 1939. The partners to the agreement were Canada, the United Kingdom, Australia and New Zealand. Construction work began the next day, and the plan has been in continuous operation since then.

In April, 1940, the first students commenced training. There were only 169 pupils in the first classes—50 pilots, 44 observers and 75 wireless operators. Then all over Canada 154 air and ground training schools sprang up—more than twice as many as the 74 schools originally planned. The last one was opened in December, 1941, just two years after the plan was inaugurated. Royal Air Force special schools, already established and in operation in Canada, were incorporated into the plan on July 1, 1942.

Purpose of Plan.—This great undertaking was motivated by the need for speed, efficiency and

economy. Its four chief aims were:

1. To meet and hold the enemy air strength and prevent it from doing too much damage to the United Kingdom, the last citadel of freedom in Europe and spring-board for attack on Germany.
2. To attain and maintain air supremacy.
3. To destroy enemy air power.
4. To destroy the economic life of Germany and its allies.

It was intended that the plan would continue until March 31, 1943, but its early success prompted the participating countries to sign a new agreement on June 5, 1942. Thus the second B.C.A.T.P. went into effect on July 1, 1942, and will last until March, 1945.

Trainees and Graduates—
The cumulative total of trainees from all sources entered on air crew undergraduate training courses from the inception of the plan to August 25, 1944, was 152,925. This figure does not include 5,296 R.A.F. and Fleet Air Arm personnel graduated from R.A.F. schools established in Canada prior to July 1, 1942.

These schools, however, were supervised and administered under the plan, so the grand total of all entrants into training in Canada was 158,221.

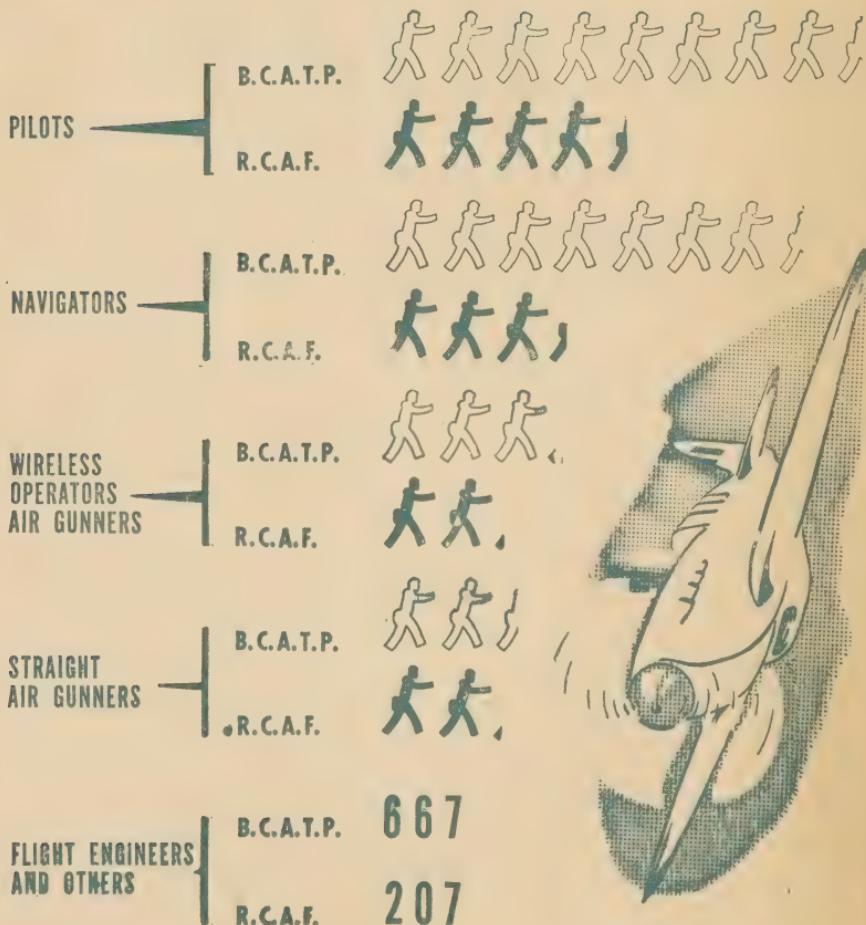
Of the total of 152,925 trainees, there was graduated to August 25, 1944, a total of 108,957, and 20,109 were unsuccessful in completing their difficult courses. Addition of the 5,296 graduated from the R.A.F. transferred schools brings the total to 114,253. Of these, 60,603 were R.C.A.F. personnel, 34,361 R.A.F., 8,067 Royal Australian Air Force, and 6,026 Royal New Zealand Air Force.

The original agreement called for a peak air crew production at the rate of 20,864 a year. With expansion of the program the sights were raised to a planned peak of 52,503 a year. That rate of production was to have been reached in June, 1944. The actual peak was reached in February, 1944, when 3,854 air crew were graduated—an annual rate of 50,100. In that month the eventual objective was lowered to a rate of 20,965 a year, but this lower rate of production will not be reached until the spring of 1945. There are now more than 15,000 in air crew training, of whom more than

8,000 are R.C.A.F. personnel. The total number of R.C.A.F. potential air crew (untrained) either awaiting entry into initial

training schools or undergoing pre-air crew education to qualify for air crew training is between 4,000 and 5,000.

TOTAL AIRCREW GRADUATES TO AUGUST 25, 1944



EACH SYMBOL REPRESENTS 5,000 MEN

Training Slows Down.—Because of the slowing down begun in February, 1944, some of the men who could reasonably have expected to be well into air crew training have been kept back, and there is little likelihood that a considerable number of these men who have been awaiting training will ever be required. It was decided to release 4,200 of them for service in the army or the navy.

The release of this large group does not imply that there will be an immediate curtailment in the production of air crew graduates. There are still many thousands in the various stages of training. It takes an average of 12 months of training before graduation, and a further period of six to eight months post-graduate and operational training and familiarization work. Thus air crew will be produced for several months yet, and the plan is now operating in anticipation of what may be the requirements a year and a half hence.

With the cessation of recruiting for the air force in June there has been and will be a progressive closing of a certain number of training units and schools. The R.A.F. schools transferred to Canada were the first.

Both the Royal Australian Air Force and the Royal New Zealand Air Force have discontinued sending men to Canada for training, but there is a considerable number from each still under training. The R.A.F. is continuing to send some personnel for training, but most are personnel who have had initial training and, in addition, potential pilots have been graded for elementary flying training with from 10 to 12 hours' flying time. So long as trained airmen are required to accomplish the defeat of the enemy, so long will the B.C.A.T.P. continue to operate.

Financing the Plan.—The financial history of the B.C.A.T.P. divides into two phases. Originally it was estimated it would cost \$823,000,000, but there were certain complicating factors which arose subsequently. First the original agreement did not operate for the allotted time, but finished nine months early. Secondly, the United Kingdom established several special R.A.F. training schools in Canada. Although the responsibility of financing these rested with the United Kingdom, they had a certain effect on the

amount of cash which Canada found necessary to provide for training purposes. Thirdly, because of the critical war situation of the United Kingdom and also because of the acceleration of the training program in Canada the United Kingdom was unable to maintain the schedule of contribution in kind to which it was pledged. To the extent of this deficiency Canada purchased aircraft and other equipment on behalf of the United Kingdom and financed such purchases.

The effect of these unforeseen items was that Canada, in addition to its normal share of costs, was called on to assist in financing the R.A.F. special schools and the United Kingdom contribution of aircraft to the extent of approximately \$200,000,000. Gross Canadian expenditures in respect of the B.C.A.T.P. from its inception to June 30, 1942, excluding the \$200,000,000, amounted to approximately \$503,000,000, of which \$62,000,000 was recovered from Australia and New Zealand.

The B.C.A.T.P. is operating under a second agreement to March 31, 1945, which was estimated to cost \$1,446,000,000 to be shared equally between Can-

ada and the United Kingdom for the 33 months. To July 31, 1944, gross Canadian expenditures, shareable by the United Kingdom under this agreement, amounted to virtually \$841,000,000, in addition to which other training costs payable by Canada alone amounted to \$109,000,000. By the end of March, 1945, it is expected that the Canadian expenditures will have increased to \$1,320,000,000, of which \$185,000,000 is Canadian expense, not shareable with its co-partner. In addition to these cash expenditures by Canada, there will also have been provided by the United Kingdom contributions in kind, etc, estimated to aggregate \$360,000,000, which will give a total cost of this plan shareable by the United Kingdom of \$1,495,000,000.

To summarize, it is estimated the cost of training under the British Commonwealth Air Training Plan in Canada to March 31, 1945, will be \$2,328,000,000, which will be borne by the partners in the plan in the following proportions:

Canada.....	\$1,324,000,000
United Kingdom....	862,000,000
Australia.....	96,000,000
New Zealand.....	46,000,000

Price Control Defeats Inflation

ONE of Canada's greatest wartime achievements has been in the field of price control. Canadians today are paying the same price for flour, bread, sugar and rolled oats as they did three years ago when an overall price ceiling was imposed in December, 1941. They are paying 14% less for milk. Food, generally, has increased less than 5% in price. Rent has gone up less than 1%. Clothing has gone up only slightly more than 1%. House furnishings cost just about the same; fuel and light are less expensive than they were before the price ceiling.

Not only has the cost of living been stabilized so that the consumer can buy just as much in the way of goods and services per dollar, but the businessman has benefited. This is shown by the fact that in 1943, for example, there were only 314 commercial failures in all Canada—the lowest number since records of business failures were first kept at the beginning of the century—compared with 1,219 in 1938.

Prices Board.—Both the consumer and the businessman have been helped not only by price control, but also by the policy of the Wartime Prices and Trade Board of ensuring an equitable distribution of essential goods.

The Wartime Prices and Trade Board was set up at the outset of the war against Germany on September 3, 1939, "to provide safeguards under war conditions against any undue enhancement in the price of food, fuel and other necessities of life, and to ensure adequate supplies and equitable distribution of such commodities." The Canadian government recognized that mobilization of the nation's manpower and resources would inevitably set in motion strong inflationary forces which, if unchecked, would drive up prices and hamper the war program.

For the first two years the board followed a policy of controlling selected prices and making special provision for overcoming difficulties in the supply of goods, some of which had to

be carried over long sea routes. Price control during this two-year period applied to sugar, butter, wool and rentals. Meanwhile, prices of certain commodities which had been depressed, were allowed to rise. (The general level of living costs in Canada at the beginning of the war was 17% lower than the 1926 average, representative of the period of stable prices from 1920 to 1930, after World War I readjustments.) Mainly, the increases were allowed on agricultural products which were brought into a more favorable relationship with other prices.

In the autumn of 1941, when a broad inflationary rise in prices threatened, an overall price ceiling was applied to all goods and most services. The

ceiling, already in effect on rents in certain specified areas, was extended also to the rents of all real property, except farm lands.

Cost-of-Living Index.—

From August, 1939, to October, 1944, the overall increase in the cost of living was 17.7%, but only 2% of this increase took place after the general price ceiling was adopted. (This is in contrast to what happened in World War I when between August, 1914, and October, 1919, the cost of living went up 66.3%). The following table shows the increases which have taken place in the various groups in the cost-of-living index since August, 1939, at the outbreak of war, and since November, 1941, when the price ceiling was introduced.

	Point Changes Since August, 1939	Point Changes Since November, 1941
Food index.....	31.7	4.3
Rent index.....	7.9	.7
Fuel and light.....	9.8	-3.6
Clothing.....	21.5	1.3
Home furnishings.....	17.3	.4
Miscellaneous.....	7.5	2.1

These figures indicate how successful the Canadian methods to stabilize the cost of living have been. This stability has been maintained despite the fact that 50% of Canada's produc-

tion facilities has been concerned with war needs. In World War I only 10% of its resources was devoted to war, yet food and clothing more than doubled in price.

Not only has the pressure on prices been far greater in this war because of tremendously increased war production, but also because of heavy increases in costs. Until the submarine menace was overcome, the rise in ocean freight rates and war risk insurance increased the cost of cargoes. A shortage of metals and various other materials necessitated use of higher cost substitute materials. Moreover, transportation costs rose because of the need to bring supplies for longer distances and because of frequent substitution of land for water transportation. Operating costs were also raised because of the difficulty of obtaining supplies required and the movement of skilled workers into the forces or war industry. Meanwhile, wage rates in agriculture and fishing tended to rise.

Some of the methods adopted to hold the price ceiling and maintain supplies of essential goods have been: Simplification measures, which also saved materials by reducing the number of styles or lines, types of packaging and deliveries; division of increased costs among producers, wholesalers and retailers; remission of special war taxes and duties on essential imports.

When these steps have not been sufficient to maintain supplies, subsidies have been paid on imports such as oranges, tea and coffee. Domestic subsidies have been paid to maintain production of necessities and reduce the price to the consumer. A subsidy is paid on fluid milk, by which means the consumer price is reduced by two cents a quart. Butterfat and milk for cheese production are subsidized also.

Rationing.—Canada has rationed several foods in this war including sugar (four-fifths of it is imported), tea and coffee, butter, preserves, meat and, through priority distribution, evaporated milk. Meat, tea and coffee are no longer rationed.

The rationing is by a simple coupon system. Different coupons, each good for a fixed quantity and valid at regularly announced dates, are provided for the rationed commodities.

Consumer rations are:

Sugar—	$\frac{1}{2}$ pound per person per week.
Butter—	approximately $\frac{1}{2}$ pound per person per week.
Preserves—	two coupons valid each month; coupon value varies according to the commodity desired, from 12 ounces of jam, jelly or marmalade to 40 ounces of molasses.

In addition to the ordinary sugar ration, an allowance of 10 pounds per person is provided annually for home canning.

Distribution of evaporated milk is restricted to priority users in areas adequately supplied with fluid milk. In regions where fluid milk supplies are inadequate, dealers are required to reserve sufficient stocks to meet the requirements of their coupon holders and may sell the remainder to consumers generally. Priority users get 16 evaporated milk coupons every three months; each coupon is good for the purchase of six 16-ounce tins.

Consumers mainly are concerned with rationing by coupon, but in the case of certain commodities permit rationing is employed. It is a convenient device for distributing fairly durable goods that are essential to certain groups in the community or are purchased infrequently. Articles and services rationed in this manner have included certain electrical supplies, small arms ammunition, farm and office machinery, railroad watches.

Goods in short supply but not rationed are allotted by wholesalers to merchants according to the Prices Board policy of equitable distribution. This

policy is further carried out by the retailers in limited sales to their customers as in the case of canned vegetables.

The Wartime Prices and Trade Board, in addition to controlling prices and maintaining essential supplies for the civilian consumer, has first responsibility for all navy, army and air force rations in Canada, Newfoundland and Labrador, and makes specific allocation of foodstuffs to the Red Cross for the many tons of parcels shipped overseas to prisoners of war. It also allocates supplies for canteens operated for the armed forces by the auxiliary war services.

Canada remembers that the worst part of the inflationary rise in prices in World War I took place during the 18 months after the Armistice—a rise which was followed by an even more abrupt and disruptive deflation. Consequently, it proposes to maintain the price ceiling after the defeat of Germany until such time as peacetime conditions make it possible to relax price control.

This review of past accomplishments is to be followed next month by an article which will look ahead with price control.

WARTIME INFORMATION BOARD PUBLICATIONS

IN addition to CANADA AT WAR, certain other reference material dealing with various aspects of Canada's war effort is available in limited quantities on request. It may be obtained by writing to the Wartime Information Board, Ottawa. Such material includes:

Reference Papers (issued irregularly)—Recent numbers deal with:

- The Royal Canadian Navy.
- Canada (its geography, population, history, constitution and war effort).
- Canadian Prisoners of War.
- Canadian Food and Agriculture in the War.
- Canadian War Service Voting Regulations.
- Canadian Schools and Universities in Wartime.
- R.C.A.F. Personnel Counselling Program.
- Canadian Merchant Seamen.

Facts and Figures Weekly — a summary of significant Canadian events.

Airmail Bulletin—a daily summary of developments in Canadian affairs, prepared for distribution among Canadian offices abroad. It is available to Canadian business houses desiring to forward it to overseas representatives.

Postwar Planning Information (issued fortnightly)—a continuing survey of post-war planning in Canada.

Consumer Facts—a monthly bulletin of background information designed especially for teachers of home economics, writers, broadcasters and group teachers. It summarizes government orders affecting consumers.

Home Front Bulletin—a weekly bulletin containing current information of interest to women. It is designed for display in schools, libraries, etc.

Canadian Affairs—a bi-monthly educational service for the armed forces in Canada and overseas, with a limited civilian distribution. Among home edition articles available are:

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| Future for Fighters. | Wealth in Wood. |
| The New North. | The Prairie Provinces. |
| Canada as a Pacific Power. | Power for Prosperity. |
| Canada—World Trader. | Ontario. |
| Canada and the Post-War World. | Canada and UNRRA. |
| People on the Land. | Will There be Jobs? |
| Canada's Constitution. | The Maritimes. |
| A Film Policy for Canada. | Skyways of the Future. |
| Canada and the U.S.S.R. | Canada Plans Security. |

Canadian Affairs Pictorial—a monthly pictorial sheet (24 by 36 inches) supplementary to CANADIAN AFFAIRS, with a limited civilian distribution. Pictorials available include:

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| Canada—World Trader. | Wealth in Wood. |
| Controls for Victory. | The Prairies and Their People. |
| Canadian Agriculture. | Ontario. |
| The New North. | The Maritimes. |
| Movies for the Millions. | |

Graphic Sheet Series—in which various problems are dealt with for the benefit of industrial workers and trade union members; for use as enclosures, pay envelope stuffers, pin-up sheets, etc. Among issues available are those on:

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| Unemployment Insurance. | Labour-Management Committees. |
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Wallnews—a monthly two-color wall news-sheet (24 by 36 inches) containing news of the war and production fronts, photographs, charts, war maps, cartoons, etc., with a poster on the reverse side. It is available in quantity for posting in industrial establishments, labour centres, schools, libraries, etc.

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